

The Iron Age

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Methods of Bracing Boiler Heads.

The accompanying illustrations, taken from a recent issue of the *Locomotive*, show the methods of bracing the heads of horizontal tubular boilers most commonly practiced in this section of the country. Our contemporary thus examines and compares them:

Fig. 1 shows the style of bracing recommended by the Hartford Steam Boiler Inspection and Insurance Company in their specifications where L or I iron is used to attach the brace to. We recommend the L-iron, as shown, in preference to I-iron. The pieces should be riveted to the head above the tubes (of which only the upper row is shown in the cut) in a radial position. By making this disposition of them we are enabled to use a straight brace, and the resulting pull on the brace is more direct than it would be with the brace in any other position. The L-irons should be of the best quality obtainable, 4 x 4 x 1/2 inches. The rivet holes in their flanges, both for the attachment of the L-iron to the head and for the attachment of the brace to the L-iron, as well as those in the boiler-head, should all be drilled, not punched. This makes a better job.

Fig. 3 is a view of the form of brace recommended for use with the foregoing arrangement of L-irons, to a larger scale than Fig. 1. These braces should be made of the very best round iron, 1 inch in diameter and of single lengths. The ends should be upset until sufficient stock is obtained to form the jaw and foot for attachment to the shell. This involves somewhat more labor than making them with welds, but a sound brace is insured, which is not the case with a welded brace. It is no unusual thing to find braces just welded up, and by good workmen, too, which may be snapped in two like pipe-stems by striking them a sharp blow across the corner of an anvil. This is the common way of testing such work in some shops.

Fig. 2 shows a very common method of bracing the heads of tubular boilers. Two pieces of L-iron are riveted horizontally across the head of the boiler above the tubes. The braces are attached by pins passing through the braces being held between the L-irons, as shown. Fig. 4 is an enlarged view of this brace. It differs from Fig. 3 only in the form of the head, which is single instead of double. This makes a fairly good form of brace if it is properly constructed, but, as a general rule, it is not. If the braces were swung horizontally to the shell of the boiler, they would need only a comparatively slight twist, which could be put into the round portion of the body to bring the foot fairly on to the shell, and they would then remain taut; but many boiler makers bend them directly upward to meet the shell; this necessitates a short bend near where they were attached to the boiler-head, in consequence of which they do not remain taut for any length of time. When we wish to resist a direct pull we should always use a straight piece of material to do it with. It is always wrong in principle to put a crooked brace into a boiler. It is, moreover, entirely inexcusable.

Fig. 5 is the best brace of the three styles shown, if made without a weld, as it always should be. It is much better adapted for use on flat surfaces which are exposed to the action of furnace heat, such as furnace crowns, &c. It is no more nor less than the old-fashioned "crow-foot," and is really a hard brace to improve upon when well made. Care, however, should always be exercised in its construction and attachment to the boiler. We have found many braces of this style broken short off, with nothing to indicate how it was done, leaving it to be reasonably inferred that the breakage was due to original faulty construction. Regarding the amount of bracing necessary to properly strengthen the flat surfaces of boilers and other vessels exposed to pressure, much has been said and written, and few experiments have ever been made, but those few are

sufficient, to our mind, to settle the question near enough for all practical purposes—that is, so that we always can, with due care, know when a flat surface is well braced. The question frequently arises, How much pressure will a certain plate safely sustain? It is generally brought up by the disastrous explosion of some boiler with an unbraced or poorly-braced head. The question of the actual bursting strength of a boiler-head, say 3/4 inch thick and 36 inches in diameter, may, under such circumstances, seem for a time an important one, and is so to a certain extent; but when we stop to think that such a head should never be run unstayed, we see that the maximum strength of the head itself is but a secondary consideration, after all. The real question is to know when the bracing is sufficient.

If we take such a boiler-head as that described above and subject it to hydrostatic

pressure, to our mind, to settle the question near enough for all practical purposes—that is, so that we always can, with due care, know when a flat surface is well braced. The question frequently arises, How much pressure will a certain plate safely sustain? It is generally brought up by the disastrous explosion of some boiler with an unbraced or poorly-braced head. The question of the actual bursting strength of a boiler-head, say 3/4 inch thick and 36 inches in diameter, may, under such circumstances, seem for a time an important one, and is so to a certain extent; but when we stop to think that such a head should never be run unstayed, we see that the maximum strength of the head itself is but a secondary consideration, after all. The real question is to know when the bracing is sufficient.

Copyright Property.

The Long Island Journal for November 29 publishes the history of a copyright contest, which is very interesting to manufacturers who issue expensive catalogues containing original designs:

After several years' arduous labor the late J. Milnor Peck got into thorough working

work. The size of the book, the plates, the reading matter in Spanish and English, even to the style of the type, all were nearly identical, and a circular accompanying the book offered to build the Peck portable house cheaper than they could be built anywhere, even than by the Flushing Company, the original patentees of the plan.

Mr. Isaac Peck, who is now managing the business of the Flushing Lumber and Building Company, and acting agent of the Milnor Peck estate, procured a copy of the "Pitch Pine" book and laid the facts before distinguished counsel in New York. A case was at once made up before the Supreme Court and an injunction was served on the infringers. The facts as related all came out upon the examination, and the copyright being proved, the Pitch Pine Association were ordered to deliver to Mr. Peck all the books they had printed, and to have re-

The Manchester Ship Canal.

The great scheme of the Manchester Ship Canal, says the London *Daily News*, is to be brought before Parliament in the coming session. In a former year it passed the Select Committee of the Lords, to be lost in the same stage in the Commons; last session it got through the Commons committee, to be rejected by that of the Lords. The main contention of its opponents was that the scheme in the form in which it was then proposed would be seriously injurious to the channel of the Mersey. The committee in the Lords were not fully satisfied that this objection had been shown to be groundless. The scheme has now been remodeled. It no longer interferes with the tidal part of the Mersey, but striking more southerly goes by way of Frodsham and Runcorn, to join the estuary on its

southern or Cheshire side, near Eastham Ferry. The scheme may be briefly described as one for the formation of a ship canal, navigable by the largest vessels, from Manchester through Warrington to the estuary of the Mersey near Eastham. The distance is some 30 miles, and, though for a large part of the way the country is favorable, considerable engineering difficulties have to be surmounted. It is one of the busy districts of England. It is traversed by various great canals, by many large lines of railway and by two tidal rivers. To take through such a district a vast waterway along which great steamers and ships with lofty masts can make their passage in safety is one of the most difficult undertakings suggested in modern times. The scheme, however, is well thought out, and provision is made for all the inevitable interferences it must make with other enterprises. The proposal may almost be said to involve a reconstruction of the transport arrangements of the valleys of the Irwell and the Mersey.

The energy and perseverance which the people of Manchester and its neighborhood have shown in the prosecution of this enterprise give it additional significance. We understand that the corporations of Manchester, Salford and Warrington are to join in promoting the bill in Parliament. The people of the cotton manufacturing district seem to regard the carrying out of the plan as almost essential to their continued prosperity. They must get their cotton cheaper, and be able to ship their goods at less cost, or they may be beaten in the competition with other nations. This is the real motive of the enterprise. Whether the opinion that these results would follow is right or wrong, the large industrial communities are so fully convinced that they are ready to invest large sums in the undertaking, and even to submit to taxation for the purpose of promoting its success. In presence of such evidence it is not to be believed that considerable results would follow the carrying out of the scheme. Manchester and its great ring of towns would be practically put upon the sea. Ships would load and unload on its own quays, and the beginning of the voyage of its exported goods and the ending of the voyage of the raw material would be at the doors of the manufacturers instead of 30 miles away. It is clear enough that if this can be brought about without imposing too heavy a tax on the trade there might follow a considerable expansion of the business of which Manchester is the center. Liverpool would probably meet the competition by new facilities and reduced charges, and both ways the cotton trade would benefit. If these great communities persist in the demand for powers to carry out an enterprise which they believe to be needful to their prosperity, it is impossible that Parliament should refuse to pass the bill if it is shown that no injury to the Mersey need be feared.

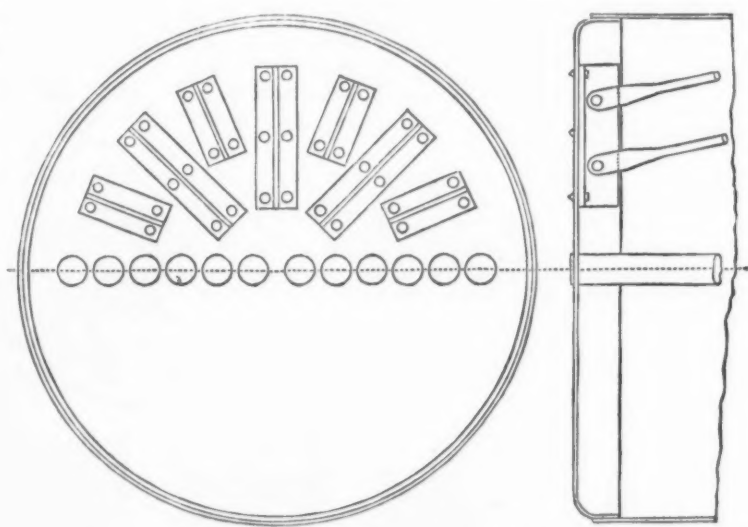


Fig. 1.—Style of Bracing Recommended by the Hartford Steam Boiler Inspection and Insurance Company.

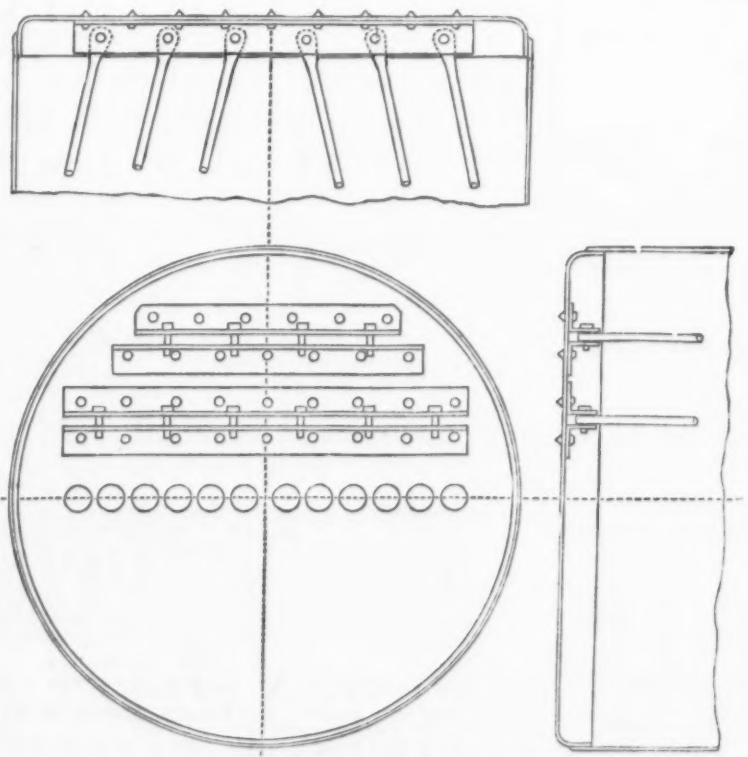


Fig. 2.—Common Method of Bracing Heads of Tubular Boilers.

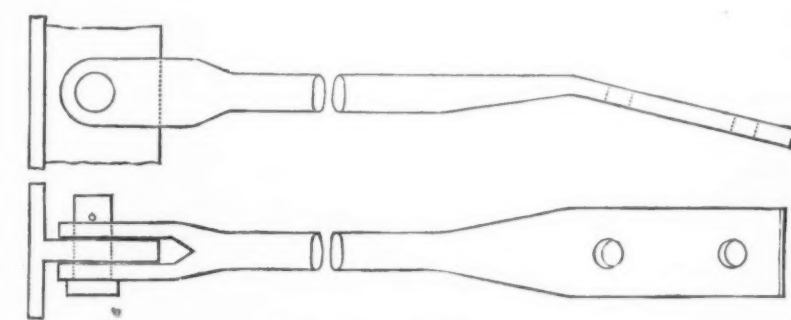


Fig. 3.—Brace With Double Head.

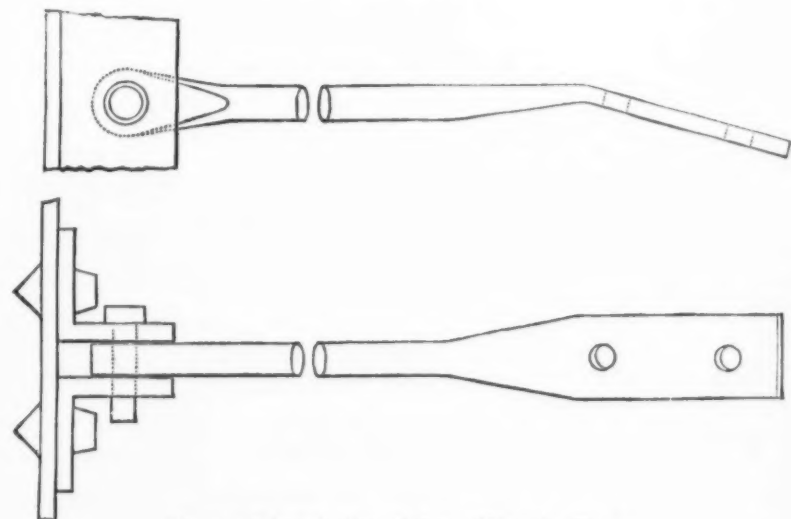


Fig. 4.—Enlarged View of Brace Shown in Fig. 2.

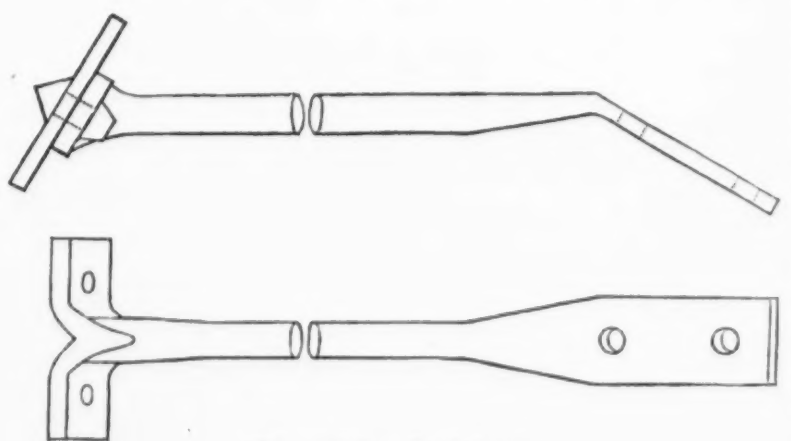


Fig. 5.—"Crow-Foot" Brace.

METHODS OF BRACING BOILER-HEADS.

pressure we shall find that a very low pressure, say 10 to 20 pounds per square inch, is sufficient to spring or bulge it much more than is allowable in practice. The only inference to be drawn from this fact is: We should always design the bracing of a boiler-head of any considerable size to take the entire pressure on that surface. This is necessary to prevent undue springing of the head. The problem thus becomes a very simple one. We know the size of the exposed flat surface, we know the pressure at which we wish to run the boiler, and we simply put in enough material in the form of braces, which are exposed simply to tensile strain, to carry the load, allowing a due factor of safety.

Launch of the Cruiser Boston.—The new steel cruiser Boston was launched on the 4th inst. from Roach's shipyard, at Chester. The Boston is 270 feet in length, 42 feet beam and 26 feet 6 inches in depth. She is rated at 3000 tons burden. In addition to two masts, square-rigged, she will be provided with eight large boilers and three cylinder engines. The combined engines will furnish 3500 horse power. It is expected that she will be able to run regularly at the rate of 15 knots an hour. Between 500 and 600 tons of coal will be carried, so

shape his elaborate plans for building patent portable houses, and successfully started large contracts for the South American trade. At an expense of several thousand dollars he prepared an illustrated catalogue of plans of this class of buildings, including detail drawings, &c., the letter-press of the work being printed in Spanish and English. The work was duly copyrighted at Washington, and several thousand copies sent to all parts of the world. Recently a second edition of the book was published, at a large expense, to meet the great demand for it, and meantime the business of the Flushing Lumber and Building Company assumed large proportions through the judicious work that had been done. In fact, it may be said that all the preliminary work in bringing this style of building before the public had been completed, and the company, having an article for which there was a great demand, had a right to expect liberal returns from their enterprise, and to be protected in their business. It may readily be understood, then, how provoked the Flushing Company were when they ascertained that the Pitch Pine Manufacturers' Association, Limited, of New York, had issued a duplicate of their valuable work. Their publication was a *fac simile* in every respect of the Flushing Company's

turned and also delivered to Mr. Peck all the books which had been sent out by them to customers. They were also required to pay all the expenses in the suit. The injunction against the Pitch Pine Association has been made perpetual, and the association have made affidavit that all the catalogues on hand have been returned, and that all other conditions ordered by the court have been complied with.

A Second Steel Ferryboat Launched.

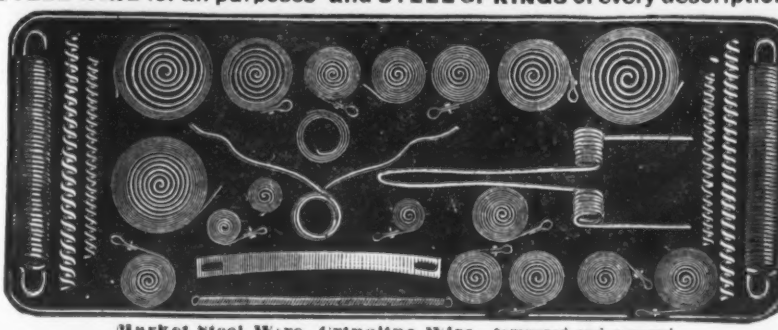
—The new ferryboat Brooklyn, the second steel vessel constructed for the Union Ferry Company, was launched on the 4th inst. at the Continental Iron Works, Greenpoint, L. I. After reaching the water the Brooklyn was towed to the Quintard Iron Works, in this city, where she will receive her machinery. Her dimensions are: Length of keel, 182 feet; length over all, 197 feet; breadth of beam, 36 feet, and depth, 13 1/2 feet. The hold is separated into 18 watertight compartments. The cylinder is 48 inches in diameter, and the piston stroke is 10 feet. The boiler is 30 feet long and 11 1/2 feet in diameter. The Brooklyn registers about 600 tons. She, with the other steel ferryboat Atlantic, which was launched at the Continental Works nearly a fortnight ago, will run on the Hamilton Ferry.

it is evident that the large industrial communities are so fully convinced that they are ready to invest large sums in the undertaking, and even to submit to taxation for the purpose of promoting its success. In presence of such evidence it is not to be believed that considerable results would follow the carrying out of the scheme. Manchester and its great ring of towns would be practically put upon the sea. Ships would load and unload on its own quays, and the beginning of the voyage of its exported goods and the ending of the voyage of the raw material would be at the doors of the manufacturers instead of 30 miles away. It is clear enough that if this can be brought about without imposing too heavy a tax on the trade there might follow a considerable expansion of the business of which Manchester is the center. Liverpool would probably meet the competition by new facilities and reduced charges, and both ways the cotton trade would benefit. If these great communities persist in the demand for powers to carry out an enterprise which they believe to be needful to their prosperity, it is impossible that Parliament should refuse to pass the bill if it is shown that no injury to the Mersey need be feared.

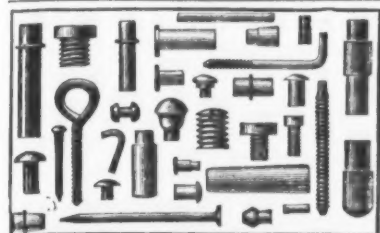
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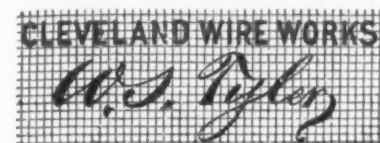
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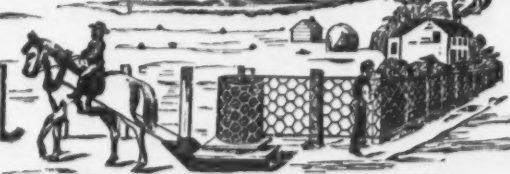
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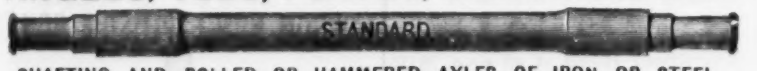
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It is well known that many accidents to and explosions of steam boilers can be traced directly to the weakness of the internal tubes. That being the case, it becomes a matter of very great importance to be able to determine the conditions governing the stability of such structures, and their ultimate strength. Previous to the year 1857 it was commonly supposed that the tube of an internally-fired boiler was stronger than the shell, both being of the same thickness. Now, however, as almost every one knows, this may or may not be the case, according to the manner in which the tube is constructed. I said almost every one, and that with a reason; for it is a lamentable fact that the tubes of many new boilers have an original strength of about half that of the shell only, although they are subject to the same deteriorating influences. In facing the subject for the first time we naturally inquire into the strength of a perfectly cylindrical tube made of homogeneous metal of uniform thickness. Such a tube subjected to external fluid pressure would have no tendency to alter its shape, but would yield only by the crushing of the material of which it is composed, and consequently its strength may be calculated with ease and certainty. Thus, if P equal fluid pressure per square inch, S equal thickness, R equal radius in inches and F represent the crushing resistance per square inch of the material, then the resistance to yielding of the tube would be

$$P = \frac{tF}{r}$$

It is almost superfluous to remark that such a formula is totally inapplicable to flues in actual practice, and this for the simple reason that a perfect tube cannot be constructed. A hollow cylinder is eminently unfitted to withstand external pressure, however well adapted it may be for internal pressures, which arises from the fact that in the former case it is in a state of unstable equilibrium, and any inaccuracy of form there may be already existing in the tube is increased by the application of the pressure, or, at least, the tendency is in that direction. Now, looking at the manner in which an ordinary flue tube is made, we see that it is impossible to obtain a truly cylindrical form, neither can the homogeneity nor the uniform thickness of the metal be insured. For these reasons, then, the conditions governing the strength of such tubes are totally different from those entering into the case of a perfect cylinder, and consequently the investigations relating to their strength must take the form of experiments on flues of different dimensions as they are usually met with in practice. Experimental investigations have revealed to us the fact that the strength of a tube varies approximately as some power of the thickness of the plate, and inversely as the length and diameter, and outside of this the strength is influenced by the number, position and form of the joints, the method of securing the ends, the deviation from the true circular form, &c.—from which it will be seen that the conditions are very complex, and that any attempt to construct a formula by purely mathematical methods must be entirely useless. Experiments have further demonstrated that it is impossible to crush the shells of their tubes, as they always give way by collapsing before arriving at a pressure which would injure the material by crushing. Having thus briefly introduced my subject, I may be at liberty to state that it is not my intention to describe any of the experiments which have been made on the strength of tubes, as I think that that would not serve any useful purpose in a meeting like this. My main object is by taking cognizance of some of the best-known empirical formulae to see how they agree with practice.

First, then, we have Sir Wm. Fairbairn's, which is:

$$P = 9672000 \frac{t^{2.19}}{LD}$$
$$P = t \left(\frac{50000}{D} - 500 \right)$$

Of all the formulae ever invented this is about the most absurd, as no notice whatever of the length of the tube is taken. Thus, according to this rule, an unstrengthened tube 30 feet long is just as strong as one 10 feet long, other things being the same, which is manifestly incorrect. The following rule appears in Nelson's "Text-book on Steam Boilers":

$$P = \frac{262.4 t^2}{LD}$$

Where t = thickness in thirty-seconds, L = length in feet, and d = diameter in quarter feet. It is a modification of Fairbairn's, but possesses the disadvantage of not being as accurate. Lloyd's rule is one which fixes the working pressure. It is:

$$P = \frac{80600 \times t^2}{LD}$$

All the above formulae are open to the very serious objection that they do not take account of the kind of joint used in building up the tube. It is pretty certain that, other things being equal, a tube whose longitudinal joints are welded or double-britted is about half as strong again as a tube with longitudinal lap joints single riveted; the strengths of other forms of joints lie between these two. You will therefore allow that a rule which does not take account of the kind of joint is very defective. The Board of Trade, in their instructions to surveyors, have published a rule to act as a guide in fixing the working pressures of the tubes of marine boilers. This rule is:

$$P = \frac{C \times t^2}{(L + 1) D}$$

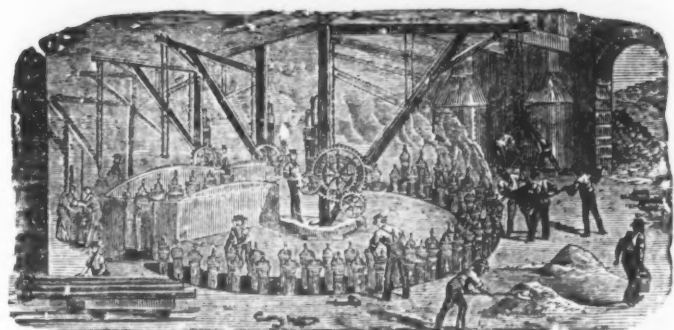
t is expressed in inches, length in feet, and diameter in inches. The constant has been fixed for all the different kinds of joints used, for example:

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* A paper read before the Owen's College Engineering Society, England, April 8, 1884, by Mr. Harrison.

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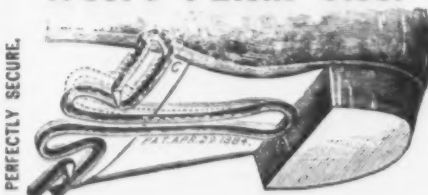
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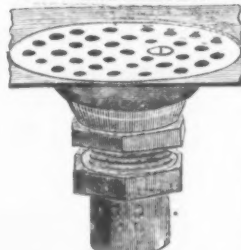
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This rule commands respect, in virtue of the high authority with which it is invested; and, indeed, as far as I have been able to judge, it is a very good rule so far as it goes. The only fault, if it be one, is that it allows too big a factor of safety. As I have just stated, it was invented to fix the working pressures in marine boilers, the tubes of which are never more than about 8 feet long, and so it happens that the rule is totally unfit for tubes of greater length than that just mentioned; so that it cannot be applied to full sized land boilers having unstayed tubes. I shall now confine myself principally to a critical discussion of Fairbairn's rule, as that is by far the best of the formulae above named for general use, as it is the best known. First, then, we must not look for perfection in this rule, inasmuch as it was deduced from the results of experiments on tubes much shorter, narrower and thinner than are found in actual practice. For example: Tube, 18 feet 6 inches long; outside diameter, 42 inches; plates, $\frac{7}{8}$ inch thick; one plate, however, was only $\frac{3}{8}$ inch; for the purpose of calculation I have taken the mean thickness equal to .406 inch. The rule gives a collapsing pressure of 120 pounds, whereas the tube actually collapsed at 80 pounds:

No.	Length.	Diameter.	Thickness.	* +
2	3 ft.	54 in.	$\frac{1}{4}$ in.	182 241
3	25 ft.	42 in.	$\frac{3}{8}$ in.	127 90
4	34 ft.	32 in. & 31 in.	$\frac{1}{2}$ in. & bare.	53 107

The 32 in. diameter was for 25 ft., and the 31 in. for 34 ft.

* Observed collapsing pressure.

+ Collapsing pressure by rule.

These examples show at once that the rule does not give consistent results. A word of

will serve to show how the rule applies to such tubes:

Diameter.	Length.	Thick- ness.	Observed collapsing pressure.	Rule.
54"	71 1/2"	1 1/4"	105	119
54"	36"	1 1/4"	132	241

and so, as a rule, it may be taken that the observed collapsing pressures of short tubes is far less than that given by the formulae again:

	Length.	Diameter.	Thick- ness.	Working pressure. Collapsing pressure by rule.	Factor of safety.	
1.....	16' 0"	2 7/8"	3/16"	50	180	3.8
2.....	10' 0"	2 7/8"	3/16"	45	161	4.0
3.....	12' 0"	2 7/8"	3/16"	60	268	4.5
4.....	8' 3"	3 3/8"	3/16"	50	290	5.8
5.....	11' 0"	2 8/8"	3/16"	40	375	6 1/2
6.....	8' 10"	3 1/8"	3/16"	50	300	4.3*
7.....	8' 0"	3 5/8"	3/16"	55	500	9.0
8.....	2' 8"	3 9/8" × 3/4"	3/16"	80	880	11.0
9.....	10' 1"	9 1/2"	3/16"	75	280	3.8†

* Now stated to be suitable for 40 pounds only.

† This tube on no account to be worked above 75.

Many years.

Before increasing the pressure on the latter tube it was recommended that it be hooped. There are samples of a whole host of similar tubes; the working pressure has been fixed by experience, and may be taken to be as much as the several tubes will bear with safety, and having due regard to contingencies. The inference, then, seems to be that short tubes require a higher factor of safety than long ones, and the shorter the tube the higher the factor.

Mr. Fletcher, the chief engineer of the

TABLE FROM THE "LOCOMOTIVE," AUGUST, 1881.

Dimensions.			Observed collapsing pressure.	P. computed by formula.									
Diameter.—In.	Length.—In.	Thickness.		Fairbairn's.	Loe's.	D.K. Clark's.	Grubb's.	Wilson's.	Lloyd's.	Board of T.	Unwin's L. lap joints.	Ditto L. butt joint.	Ditto L. and girth seams.
54	21½	.36	105	119	110	45	153	155	17	14	94	125	
54	36	.35	102	241	226	45	225	311	35	5	350	76	
30	70	.25	65	51	163	72	135	529	59	12	120	120	
42	90	.275	127	100	273	128	198	105	12	12	120	120	
42	420	.275	97	64	195	138	163	75	9	19	131	131	
14½	60	.125	125	116	149	46	127	172	19	10	105	105	
33½	390	.31	69	75	211	116	176	78	10	10	105	105	
7½	25	.157	110	77	215	148	150	109	12	12	116	116	

caution is, however, here necessary. The material of a boiler which has been working for some time is often more or less affected and weakened by corrosion and other causes, the exact value of which influence is difficult to estimate further. The tubes of such a boiler may collapse, not from overpressure, but from overheating, of the furnace plates, due to shortness of water or to deposit; and whether or to what extent these latter causes have been present to bring about the disaster requires an expert to decide, and even his opinion can only be deemed approximate; so that the observed collapsing pressure of a tube may be anything, unless it is one under experimental test. In the absence, then, of sufficient data of the sort here wanted, I think it is best to compare the formula with the working pressures of actual tubes.

All the tubes in the table below may be considered to be working at pressures bordering upon the dangerous. In the first case the factor of safety is only 1.8, but in the others it is just a little over 2. Now, Fairbairn, Rautrive and other authorities recommend a factor of safety of 6. This, as shown by the above examples, is certainly too large—at least for tubes 30 feet by 43 inches by $\frac{3}{8}$ inch or thereabouts. In a report prepared by Mr. Samson, one of the Board of Trade inspectors of boilers, the author says that he has good reason for stating that there are many flues now at work with a nominal factor of safety of 3, and some with even less, and that the inspecting and insurance companies are powerless to alter this dangerous condition of things, owing to the keen competition that exists between them. I have spoken and otherwise communicated with several of the chief engineers of these companies on this subject, and they, with one exception, admit that there is too little; that they always get more in new boilers, but have frequently to take old boilers with that factor of safety or lose the work. I have not had the benefit of Mr. McDougall's opinion on this point, but, judging from what he says respecting the strength of flues, in his last annual report to the Boiler Insurance and Steam Power Company, of which he is chief engineer, it would appear that, although endeavoring to get the resistance of flues increased, he is not prepared to refuse the insurance of boilers with flues having a factor of safety as low as 1.5.

Steam Users' Association, recommends that in a Lancashire boiler having tubes 2 feet 9 inches diameter and flanged at every ring seam the plate should be $\frac{3}{8}$ inch thick for 75 pounds pressure and $\frac{1}{2}$ inch for 100 pounds. These dimensions give a factor of safety of about 12 $\frac{1}{2}$. Sufficient has been said to show that Fairbairn's rule by no means gives a correct estimate of the strength of a tube, and in applying it to any particular case care should be had that the proper factor of safety be used.

From comparing the working pressure of a good many tubes I have determined the following formula for finding the factor of safety that may be used along with Fairbairn's rule, viz:

$$\frac{\sqrt{300}}{L}, \text{ where } L = \text{length of tube in feet.}$$

This rule appears to coincide fairly well with good practice.

Length.	Factor of safety
30 feet	3.16
25 "	3.47
20 "	3.97
15 "	4.47
10 "	5.08
5 "	7.74
3 "	10.00

In connection with Fairbairn's formula I may just say a word or two about another which may fairly be styled remarkable, viz., the one invented by Professor Unwin. This formula was deduced from the results of Sir Wm. Fairbairn's experiments, on the theory that the laws of collapse were related to the laws of the resistance of long columns to compression, and is the first attempt to deduce a rational formula for the strength of tubes. Their agreement with experiment is remarkably close—much closer than is the case with any other formula to determine to collapsing pressure. Thus:

Diameter.	Length.	Thick- ness.	Observed collapsing rule.
54 in.	37 in.	$\frac{1}{4}$ in.	125
49 in.	25 ft.	$\frac{3}{8}$ in.	127
33 1/2 in.	30 ft.	$\frac{3}{8}$ in.	99
14 1/2 in.	5 ft.	$\frac{3}{8}$ in.	125

If we apply this rule to some of the examples previously cited which by Fairbairn's rule have a very low factor of safety, we shall see that the collapsing pressures given by it are not near so low as those given by the latter:

Tube collapsing pressure by Fairbairn.	Factor of safety.	Collapsing pressure by Unwin.	Factor of safety.
123	1.9	173	2.66
136	2.1	191	3.1

If we take Unwin's formula as giving very nearly the real collapsing pressure of a tube, then the above examples will show that in their cases, at least, the factor of safety is still very low, perhaps too low, although it is much greater than the apparent factor as determined from Fairbairn's. Unwin's formula for longitudinal and girth seams like ordinary flues, is

$$P = 15,547,000 \frac{t^2}{L \cdot d \cdot 1.16}$$

All the dimensions are expressed in inches.

$$P = 7,368,000 \frac{t^2}{L \cdot d \cdot 1.16}$$

$$P = 9,614,000 \frac{t^2}{L \cdot d \cdot 1.16}$$

There are two other formulae for lap and butt joints in which the thickness enters to a different power. Reverting to the Board of Trade rule, it apparently gives a very fair working pressure for a tube about 3 feet long—i. e., say an ordinary tube flanged at

* Over 30 years.
† Many years.
‡ Strongly recommended that this tube be adopted.
§ Strongly urged strengthening by hoops.

This extract will show to some extent how this matter stands with the insurance companies. My experience is that with what are known as full-sized Lancashire or Cornish boilers, three or a little over is very generally considered to be sufficient as a factor of safety, but is certainly not large enough for shorter tubes. The following example

Paris, 1878.

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Round,
Round Blunt,
Slotting,
Slim Handsaw Taper,
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Square Blunt,
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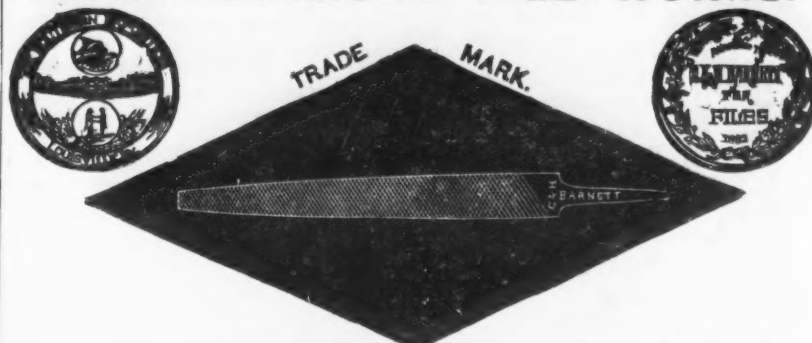
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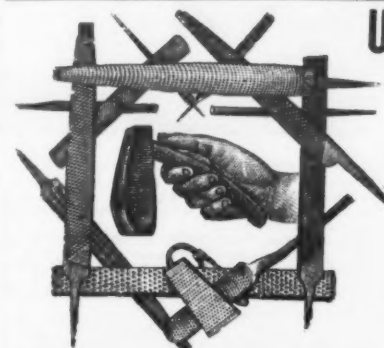
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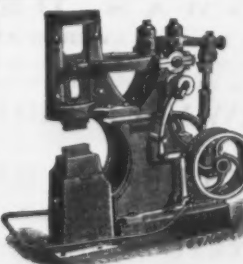
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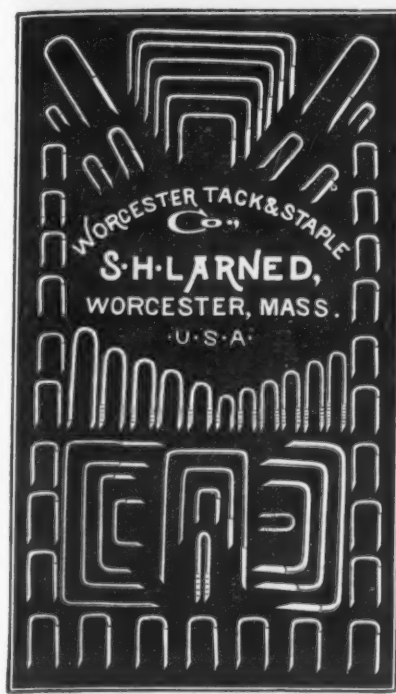
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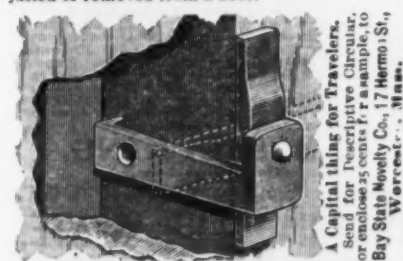
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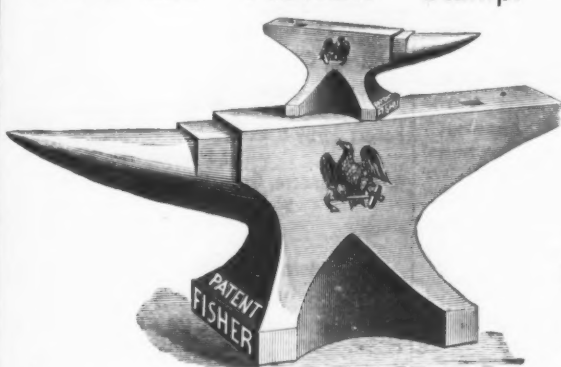
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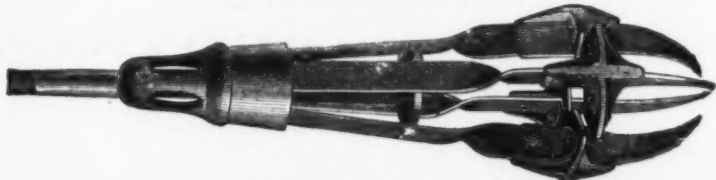


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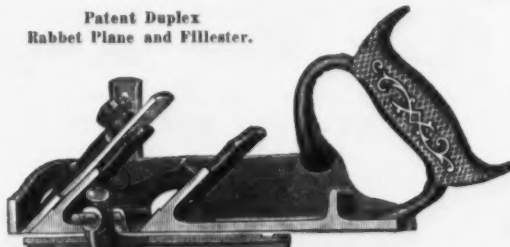
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every ring seam. Take, for example, the tube previously quoted, 2-9. "diameter 1 feet long ¾ plates, which, according to Mr. Fletcher, should only work at 75 pounds; the Board of Trade rule gives 95 pounds, and I have frequently seen such a tube working at that pressure. The rule, however, certainly gives far too low a working pressure for tubes about 6 or 8 feet long:

L.	D.	T.	W. P.	B. of T. rule.
8 ft. 3 in.	3 ft. 3 in.	¾ in. steel.	50	23
8 ft. 10 in.	3 ft. 4 in.	¾ in. "	60	21
6 ft. 5 in.	2 ft. 6 in.	¾ in. "	45	37
8 ft. 6 in.	3 ft. 5½ in.	¾ in. "	55	38
2 ft. 8 in.	2 ft. 9½ in.	¾ in. "	80	101

In the foregoing paper I have enumerated some of the best-known empirical formulae for calculating the collapsing pressure of a tube; of these Fairbairn's seems to be the most reliable (exclusive of Professor Muir's), so that I have treated it at greater length than the rest, and have endeavored to show by test cases of tubes in actual work that the rule cannot be implicitly relied on, as it manifestly requires a different factor of safety when applied to tubes of different lengths; and, moreover, is defective, inasmuch as it does not accommodate itself to the different forms of construction in use.

The Board of Trade rule overcomes the latter objection to Fairbairn's, but it is very limited in its application. The factor of safety is also apparently rather higher than is necessary, except in very short tubes. Professor Muir's formulae are undoubtedly far superior to any others yet published; but I cannot think that they should be trusted too far, inasmuch as they were deduced from the results of a limited set of experiments on the collapsing pressures of very small tubes, and which were not quite under the same condition as an ordinary flue tube.

Table extracted from Mr. Sanson's Board of Trade Report.

	Length.	Diameter.	Thickness.	W. P. of T. rule.	Actual collapsing.	Factor.
Fire box, old donkey.....	8' 10"	43"	¾"	40.3	180	4.4
Fire box, old donkey.....	8' 2½"	44½"	1 1/8"	44	300	4.5
Furnace tube, old boiler.....	9' 0"	37"	1 1/8"	61	300	4.2
Furnace tube, new boiler.....	7' 3"	38"	¾"	72½	450	6.2
Furnace tube, new boiler.....	7' 0"	38"	¾"	41½	187½	4.5
Furnace tube, new boiler.....	6' 0"	54"	1 1/4"	36	128	4.9
Main factor.....						4.78

Two flanged rings 3 feet each.

* Lapped.

† Welded.

‡ Butted.

In conclusion, I will move the following resolution, viz: That, in consideration of the very unsatisfactory state of the present knowledge on the strength of the boiler flue tubes to resist collapse, it is expedient that further and comprehensive experiments be made, and that it would be becoming of such a body as the Society of Mechanical Engineers to undertake the carrying out of such experiments.

Industries of Knoxville, Tenn.

From Knoxville, Tenn., we receive reports of an exceptional condition of business. Every manufacturing establishment of the city is either running on full time or preparing to resume work. In some cases there has been a reduction in the working force, but not to the same extent as in many other localities. The Chronicle thus reviews the situation:

The Knoxville Iron Company have been running without a single interruption for 15 years. The mills have been constantly improved and enlarged from time to time, but, owing to the general dullness of the iron trade, they are not now running their usual force of men. The Knoxville Foundry and Machine Company are running on full time and are behind with their orders. The Clark Foundry and Machine Company report a fair business and are putting in good time. The Enterprise Machine Works, at the corner of Branner and Richard streets, are running on full time and report a good business. Badge's Boiler Works, on McGhee street, are having plenty of orders and Mr. Badge is very hopeful of the future.

The Knoxville Car Wheel Company are working a full force of hands, and are filling some good orders. Their business depends largely on the state of general business. The same is true of the Southern Car Works. If business of all kinds becomes dull there will be no need of railroad cars. They are running about 75 men on full time, and are filling an order from the Memphis and Charleston Railroad. They have orders to keep them running for two months. The Knoxville Furniture Manufacturing Company are working over 100 hands, and are a way behind with their orders. Heath & Weager, manufacturers of oil cans, report a rushing business. Their trade not only extends over the entire South, but into the Northern and Western States. E. M. Turner & Co.; L. Havey; Butt, DePue & Co.; Rolan, Seay, Nelson & Co., manufacturers of tinware, cornice, &c., are all doing a good business, selling all the goods they can make. Stephenson & Getaz, manufacturers of sash, doors and blinds, on Hardee street, have recently enlarged their building, and propose to run all winter, something unusual for them to do. The Barker Manufacturing Company are pushed to fill orders for packing buckets and galls. Post, Simmonds & Co., wagon manufacturers, are nearly always behind with orders for wagons. The only industry shut down is the Tennessee Valley Zinc Works. They are busy getting up ore, and will blow in next spring.

The Chronicle gives the following reasons for the excellent condition of the Knoxville manufacturing industries: "One is that we have a productive and comparatively rich country surrounding us, which patronizes home industries as far as possible, buying such goods and implements as are made in Knoxville in preference to foreign goods. Certain of our manufacturers ship their goods to all parts of the South and many of the Western States. Our close proximity to coal and raw material is another cause for the prosperous condition of our leading industries, and, much to the credit of Knoxville manufacturers, they turn out a good quality of what they make, and when a trade is built up in any section they are generally able to hold it against any and all competitors."

New Stationary Blast Forge.

The Cohoes Iron Foundry and Machine Company, of Cohoes, N. Y., have placed on the market a stationary blast forge, designed especially for railroad shops and heavy forging, and, in fact, to be used everywhere in place of the brick forge and bellows now so common. The blast can be obtained either from a power-blower, hand-blower or bellows. The forge, as shown in the appended



New Stationary Blast Forge.

cut, is constructed of heavy cast-iron plates, supported by pipe legs, and furnished with a water and coal box. It is provided with an adjustable tuyere, admitting of regulating the quantity and force of the blast, or of completely cutting it off. The forge, which is known as No. 6, is comparatively low in cost, is durable and strong, and can be easily removed, at the same time affording room beneath it for work and tools. Its height is 26 inches, and its weight 400 pounds, the fire-pan measuring 28 by 51 inches.

Senator Cameron's Proposition.

We are assured, says the Philadelphia Press, that Senator Cameron, in proposing "a rebate from tariff duties" on goods imported in American built and owned vessels, contemplates only an abatement of so much of the duties as will place the American shipowner on a par with his foreign competitors, in spite of the cheaper labor employed by the latter in the construction and running of their vessels. This is very different from allowing a rebate of all duties on goods imported in American vessels. It is, on the contrary, an extension of the protective policy directly to the shipbuilding industry. The discrimination proposed is not novel, but, on a limited scale, has been tried before. As it aims only to place American and foreign vessels on a par, it works no injustice to the latter and would not justify or specially invite discriminating duties levied in their ports against goods imported in American vessels.

Whether it is feasible or expedient to revive and extend this principle of discriminating in favor of American vessels at the custom house is the question which Senator Cameron wants the Senate Finance Committee to take into consideration. With it he couples a second proposition to allow a premium on American-grown products and articles of American manufacture exported in American vessels. This would insure the American shipowner an outgoing cargo, while the rebate proposed would secure him from returning again empty-handed. While the present time does not seem a very promising one for an extension of the protective principle generally, the urgent necessity for doing something for the revival of American shipbuilding and the American carrying trade is recognized on every hand. Senator Cameron's proposition will bring the whole subject in definite form before the Senate, and ought to result in some substantial measure of relief for our long-prostrated and almost extinguished merchant marine.

The Inventions Exhibition.—The Executive Council of the International Inventions Exhibition to be opened in London, next May, has resolved to receive American applications for space until January 31. This further and final extension of time has been granted in order that American inventions may be fully represented. Mr. J. Pierrepont Edwards, British consul in New York, has been appointed special agent in the United States, with instructions to facilitate this object.

A sewer-gas explosion took place on Penn avenue, Pittsburgh, on the evening of the 4th inst. The residents of the avenue between Twenty-eighth and Twenty-ninth streets were shocked by a terrible report which shook the houses on their foundations. The crash of breaking windows and falling stones was heard immediately after, and the fear of an impending earthquake drove the people out on the street, only to be covered with a shower of mud and gravel. It then appeared that the explosion had been caused by sewer gas, which had blown the tops off four sewer manholes in the block named. A large number of people were on the street at the time of the explosion, but no one was injured.

At a recent trial of sheaf binders at Shrewsbury, England, under the auspices of the Royal Agricultural Society, between English and American machines, the former was declared to have gained the victory.

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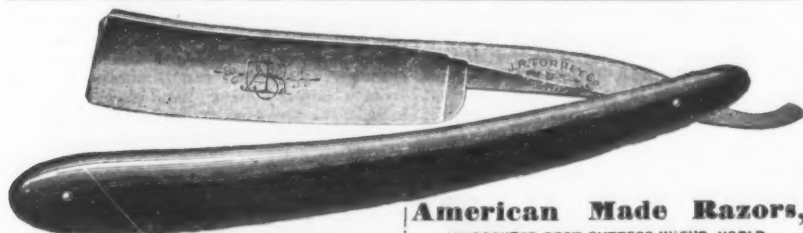
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NOW, This, is to Witness, that, in consideration of the forbearance of the Representatives of the said John Wilson to sue me for damages for the wrong aforesaid, I do hereby undertake and agree,
FIRST, to surrender and deliver to the Attorneys for the said John Wilson, all knives now on hand, and in my possession, or under my control, bearing the said imitation trade-mark, and
SECOND, I further undertake and agree to and with the said John Wilson, and his legal representatives, not to manufacture or sell, or cause to be manufactured or sold, at any time in the future, Knives or other Cutlery, bearing his trade-mark aforesaid, or any imitation or simulation thereof. IN WITNESS WHEREOF, I have hereunto set my hand and seal at West Mansfield, aforesaid, this thirty-first day of May, 1883.

WITNESSES:
E. M. REED,
(Attorney for Defendant.)

G. A. ROBINSON. (L.S.)

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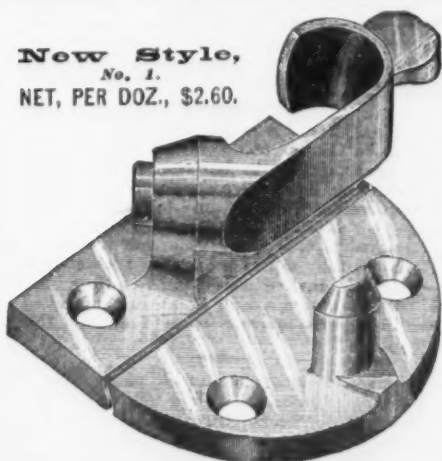
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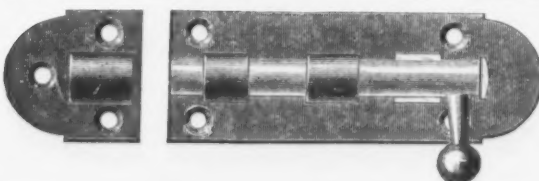
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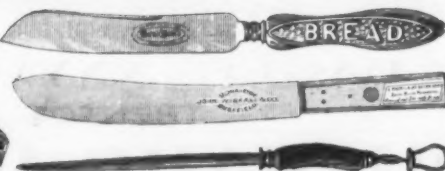
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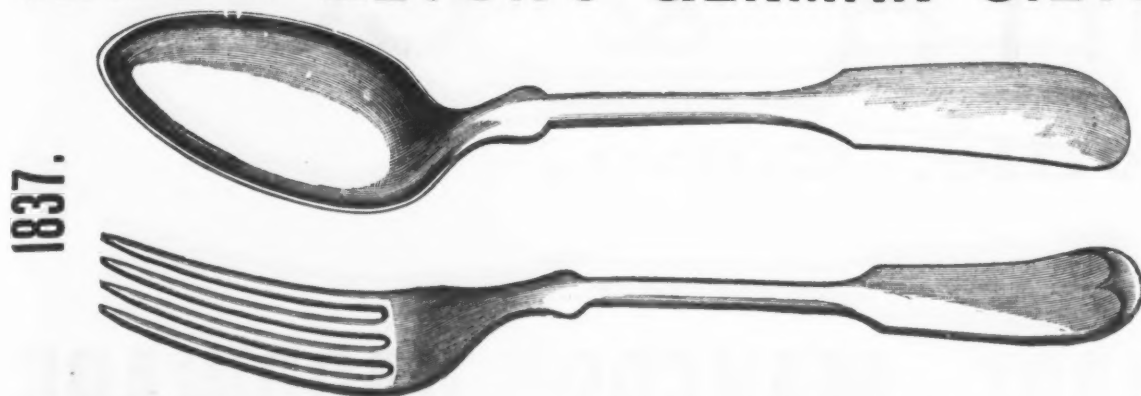
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CATALOGUES ON APPLICATION.

The First Chinese Locomotive.

The principal coal mine in China is situated at Kaiping, some 80 miles from the nearest market for the coal, and 30 miles from the nearest deep water. A railroad would have been the most natural and business like way of transporting the coal to the consumer, but in order to meet Chinese prejudices a small canal was made. As the canal could not be brought nearer than 7 miles from the colliery, the English colliery engineers bridged the gap by a solidly-constructed tramway.

The colliery was created by the fiat of Li Hung Chang, one of the highest authorities in the Empire, and was part of a comprehensive scheme for utilizing foreign inventions, so as to enable China in time to become independent of foreigners altogether. The execution of the plan was intrusted to a man of singular probity, energy and business capacity, a Cantonese named Tong-kin-sing, who recently visited Europe. A stronger combination of authority and energy was hardly possible in China. When the tramway had been laid on the standard gauge, and the heavy part of the work necessary for starting the colliery was done, Mr. Kinder, the engineer in charge, got together a discarded boiler and sundry scraps of old material, and set his workmen to occupy their spare time in a small shed on a job which attracted no attention from the Chinese proprietors. When the job had been advanced some stages, Mr. Tong-kin-sing inquired what was going on, but accepted the evasive answer which, in the absence of a mint, is the only current coin in China. Later, when the features of the object began to put on a suspicious resemblance to the drawings of locomotives which appear in illustrated papers, the director was told it was a toy engine, the construction of which tended to keep the men employed, whereupon Mr. Tong severely denounced the duplicity of the engineer and ordered the work to be stopped. Moreover, fearing that the thing might be bruited abroad, Mr. Tong waited on the Viceroy, and explained to him that he had caught those rascally foreigners making a locomotive, but he had given them a severe scolding, and so he delivered his soul. The Viceroy, of course, applauded his conservative caution, and so delivered his soul. Whatever might be the upshot thereafter, the burden would clearly rest on the shoulders of the foreigner. But Mr. Kinder would have been prepared, if needful, to carry a heavier weight than that, and the work went on, as did the protest, until the completion of the locomotive, which Mr. Kinder was so bold as to label, in the regulation brass letters, "The Rocket of China."

The directors had now become so far reconciled to the monstrous creation as to consent to its being used in switching, but it was forbidden on any pretext to be used on the line, which was being run very badly by mules. By-and-by a passenger-car was unobtrusively constructed out of waste materials. On one occasion a number of officials and others visited the works and desired to see the canal. It was raining, and there was no means of dry conveyance except the car, into which the visitors entered, and Mr. Kinder quietly hooked on the "Rocket" to draw it, telling Mr. Tong-kin-sing that, the day being wet, nobody would be looking. The directors protested in the most formal manner, but went. The whole party were pleased with the excursion, and so the railway became a fait accompli. The Viceroy, who was secretly delighted that so much had been done without the heavens falling or the earth quaking, assented to the engine being run regularly, only enjoining on the managers the desirability of thrusting their heads rather deep in the sand, so as to escape observation. Two new locomotives, with other rolling stock, were soon ordered from England, and the "Rocket," having fulfilled its mission, is now preserved lovingly in a shed, where Mr. Kinder, with justifiable pride, shows the pioneer locomotive of China. The railway is but 7 miles long, but it is the point of the wedge which is destined to split the rock of Chinese stagnation.

To this account, which we find in a recent issue of *Engineering*, it may be well to add that the gradual disappearance of Chinese prejudice against progressive measures is now being practically demonstrated in this country by the work of a Chinese commission, who are gathering information on railroad and metallurgical matters. It is understood that the Chinese Government contemplates extensive railroad building, the erection of blast furnaces—in short, the adoption of a progressive policy, and, while nothing very definite yet seems to be known about the movement, it is more than probable that the near future will witness some startling developments.

The St. Louis Ore and Steel Company

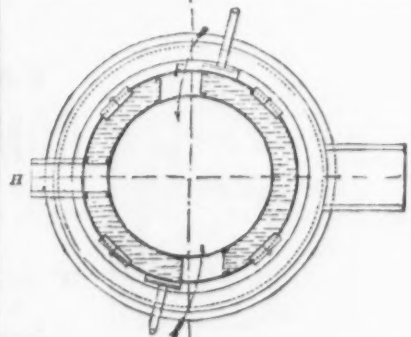
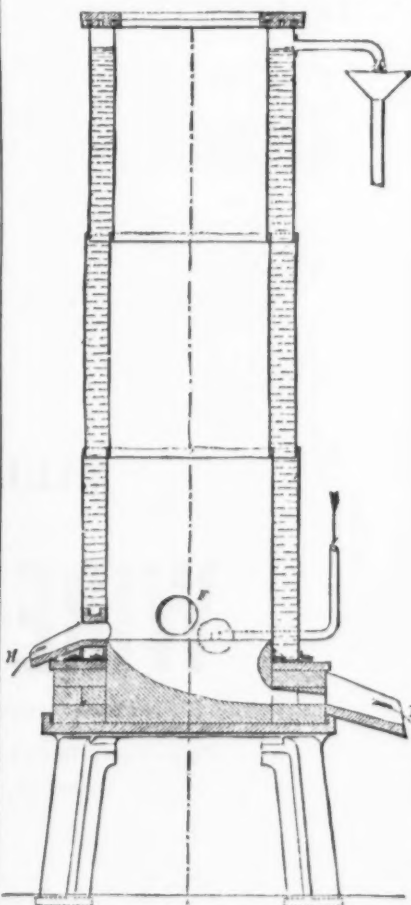
According to the St. Louis papers, on December 1 there were two very important applications in the matter of the St. Louis Ore and Steel Company's receivership, in the United States Circuit Court. The first was on the part of Rufus J. Lackland and Timothy E. Edgar, trustees under a deed of trust given by the Vulcan Iron Company to protect an issue of \$1,000,000 bonds, bearing originally (from May 24, 1875) 10 per cent. interest; but that rate was reduced May 24, 1877, to 7 per cent., by reason of the addition of a mortgage on the company's interest in the Bessemer steel process patents. They represented to the court that the property held to secure the bonds is not worth \$450,000, and by reason of litigation the Bessemer patents are daily depreciating in value. The Vulcan Iron Works and the Bessemer patents were included in the assets of the Ore and Steel Company in the application for a receiver and the appointee of the court controls the property, the trustees allege, to its detriment. They ask an order of court taking the property out of the receiver's hands, and permitting a sale, so that the bondholders may not suffer by further depreciation. The trustees also file a demurrer to the bill of complaint.

The other application was in the form of an intervening petition filed by Charles P. Chouteau, H. M. Mandeville, L. P. Hanna,

Edward Walsh, Jr., L. Holbrook, W. C. Henscher, N. L. Gray, executor of Ralph Sellow, and others, representing about 2500 shares of Ore and Steel Company stock. The petition admits some of the a-sections of the bill under which the receiver was appointed and excepts to others, the most important of which is the assignment to the Ore and Steel Company by the Pilot Knob Company of 450 shares of stock, representing a par value of \$45,000, for the assumption by the Ore and Steel Company of debts of the other company. The assignor retained the stock, and did not convert it into stock of their own company. And the other point is the charge that the issue of bonds of the Grand Tower and Carb ndale Railroad, September 22, 1883, amounting to \$405,000, to R. M. Olyphant and E. A. Hitzcock, was invalid and fraudulent, as the law of Illinois was not complied with; the issue was not for the benefit of the road, and the bonds were given the president and directors as collateral for their indorsement of notes of the Ore and Steel Company, and were not sold for money. The intervenors allege that all of the G. T. and C. R. R. was owned by the Ore and Steel Company, with the exception of a few shares held by directors to qualify them, and the other stockholders were only nominally such. It is also claimed that in February, 1884, knowing the company to be insolvent and owing \$400,000 unsecured debts, the president secured the indorsement of the directors to the issue. The petitioners then set forth that no attempt has been made to defend the property of the company against the suit of Olyphant, and ask the court to take cognizance of their presentation of facts.

A Water-Cooled Cupola Furnace.

We take from *London Engineering* the annexed illustration of a cupola invented by Dr. Otto Gmelin, of Budapest, for smelting iron, copper or other metals, which has during the last few years won ground in Austro-Hungary and is now also being introduced in Germany. The illustration hardly requires any further explanation considering the simplicity of the principle on which the furnace is constructed. Two concentric cylinders of boiler plates, with an annular space between them, closed at the bottom and open at the top, are placed on a foundation ring



A Water-Cooled Cupola Furnace.—Vertical Section and Sectional Plan.

of brickwork. Cold water enters the annular space at the bottom, and the warmed water flows off below the upper edge of the cylinders. The interior of the inner boiler-plate cylinder is made rough, and is covered with fire-clay. The annular space between the two cylinders is covered by a cast iron plate which lies loosely on the top of the two cylinders. Two circular grooves in the cast-iron top plate maintain the two cylinders at the correct distance from each other. The outlet of the melted metal and of the slag takes place through tubular boiler-plate connections passing through the water space and attached to the inner and outer cylinders. The construction has lately been considerably simplified and strengthened by making the inner furnace cylinder of a welded tube, with tubes for air inlets welded on all in one piece.

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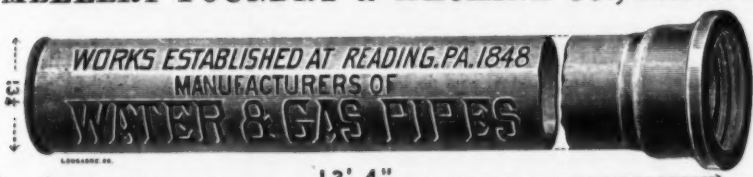
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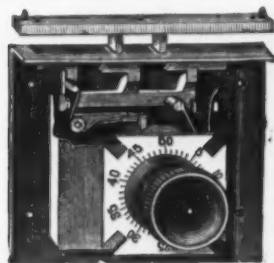
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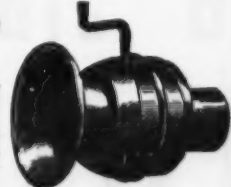
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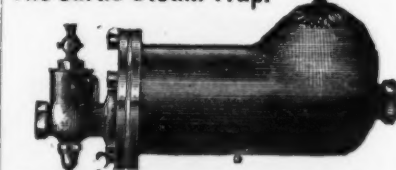
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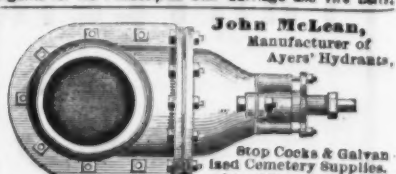
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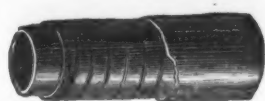
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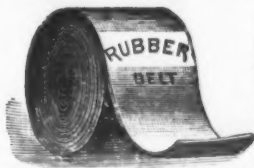
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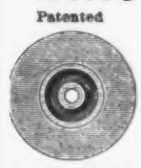
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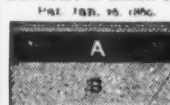
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Machine Belting,
Billiard Cushions,
Emery Wheels.This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham
Elevators at Chicago, which have been running perfectly for more than twelve years, also those for
Armstrong & Co. of Chicago, Vanderbilt's Elevators for the N. Y. Central & Hudson River R. R., the
great Elevators of the Penna. and Erie Railroads, of Jersey City and Hoboken, Dow's Stores, of Brook-
lyn and many others. In fact, the largest belts for the largest Elevators in the world.
A single carrier belt in the Penna. R. R. Elevator is over 200 feet long, weighing 18,000 pounds, and
has run perfectly from the start.**LINEN and COTTON HOSE.**

Plain and Rubber Lined,

Circular Woven-Seamless Antiseptic RUBBER
LINED "CABLE" HOSE and "TEST"
HOSE, Vulcanized Para Rubber and Carbolized Duck,
for the use of Steam and Hand Fire Engines, Force
Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c**Emery Wheels and Packing.**

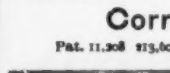
ORIGINAL

**Solid Vulcanite
EMERY WHEELS**The properties of these Wheels are such that they can be used with great advantage and economy
for cutting, grinding and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble,
Glass, etc. These wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools,
Plows, Safes, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements, and small
Machinery of almost every description.

PATENT ELASTIC

Rubber Back Square Packing.

BEST IN THE WORLD.

For Packing the Piston Rods & Valve Stems in Steam Engines & Pumps.
It represents that part of the packing which, when in use, is in contact with the piston rod.
A. The elastic back, which keeps the part B against the rod with sufficient pressure to be steam tight
and yet creates but little friction.
This Packing is made in lengths of about 2 feet and of all sizes from 1/4 to 1 inches square.**Corrugated Rubber Mats and Matting.**For Halls, Flooring, Stone and
Iron Stairways, &c.This practical and indispensable arti-
cle—especially for wear where exposed to
ice, snow or slush—was first intro-
duced by this company several years
ago, and its real value is in being
almost indestructible, when
proper materials are used in
its manufacture, whilst the cheap,
inferior quality forced on the public by reckless imitators of our patent goods soon becomes brittle
and crumbles to pieces. Address**NEW YORK BELTING & PACKING CO.,**

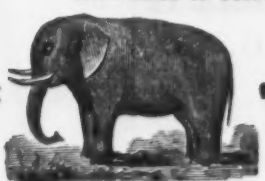
Warehouse 15 Park Row (Opposite Astor House), New York.

Branches: { No. 308 Chestnut Street, Philadelphia; 131 Lake Street, Chicago;
52 and 54 Summer Street, Boston.
JOHN H. CHEEVER, Treas. JOHN D. CHEEVER, Dep. Treas.**BUCK BROTHERS, Millbury, Mass.**The most complete assortment in the U. S. of
Shank, Socket Firmer and Socket Framing Chisels,
PLANE IRONS.CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by un-
principled persons, who represent them as our make. Our tools are stamped "BUCK BROTHERS,"
and our labels have on our trade-mark also "Riverlin Works."**PHOSPHOR-BRONZE**

—FOR—

**BEARINGS, SLIDE VALVES, CYLINDER RINGS, CROSS-
HEAD GIBS, STEPS, BUSHINGS,**And all purposes where Maximum Durability, Anti-Frictional
and Non-Cutting Qualities are Desirable.**PUMP RODS,
BOLTS & NUTS,
MACHINE and WOOD
SCREWS, &c., &c.**Combine Toughness, Strength, Durability and
Resistance to Corrosion,

TRADE



MARKS

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CASTINGS OF ALL KINDS TO ORDER.

SEND FOR PAMPHLET AND PRICES.

THE PHOSPHOR-BRONZE SMELTING CO., LIMITED,

No. 512 Arch St., PHILADELPHIA, PA.

Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the U. S.

**DROP
FORGED.****MERRILL BROS., 26 First St., Brooklyn, E. D., N. Y.**

and contract without any resistance as
the temperature in the furnace changes, and
the consequence is that repairs are hardly
ever required. The first furnace built upon
this principle has now been at work daily
for the last 2 1/2 years without ever having
required any repairs to the boiler plates of
the cylinders. The smelting operations can
therefore also be kept up for any length of
time without interruption. The energetic
cooling of the inner smelting cylinder which
takes place with this system of furnace is
also stated to afford advantages as regards
the saving of fuel (equal to 6 to 8 per cent.),
and the decrease of burnt metal as well as
the good and even quality of the castings.
The upper part of the furnace never gets
hot, and the coke does not begin to burn
until it arrives at the lower part of the
furnace, where the smelting process takes
place. The carbonic acid formed here
escapes unchanged without being reduced to
carbonic oxide as it passes through the upper
charge of the furnace. The metal thrown
in at the top of the furnace arrives com-
pletely unchanged into the smelting zone,
where it is brought to the smelting point
once by a very strong blast. The furnace
remains always round and smooth, which is
also a very important feature with regard to
economy of coke and good quality of the
castings. It is likewise unaffected by chemi-
cal action, and the quality of the castings
will therefore be considerably improved by
the fact that this furnace admits of an addi-
tion of any quantity of basic substances
without any risk of damage.

This furnace offers special advantages in
cases where scrap iron can be had cheaply,
as, on account of the small consumption of
coal and silicium, much more scrap iron than
usual can be used along with the pig iron
without any fear of obtaining hard castings.
The arrangement also offers advantages in
cases where it is necessary to produce special
qualities of castings—for example, hard
castings—as the foreman can with much
greater accuracy calculate the proportions of
the materials to be put into the furnace to
procure an even quality throughout than he
can with ordinary cupolas.

The firm of Ganz & Co., of Ofen, who
have a very high reputation for their chilled
rolls, are now altering all their furnaces to
Dr. Gmelin's principle, and a number of
other firms of high standing have also
adopted Dr. Gmelin's furnace, namely, the
machine factory of the Hungarian Govern-
ment Railway, Budapest; the Osterreichische
Montangesellschaft, Vienna; the Austro-
Hungarian Government Railway, Vienna;
the Eisenhütte, Undine; Count Waldstein's
Iron Works, Sedlec, Bohemia, and Howaldt
Brothers, Kiel, Germany.

NEW PUBLICATIONS.**THE ELECTRICIAN'S POCKET-BOOK.** By Gordon
Wigan. Size, 6 1/2 by 4 1/2 inches, 318 pages. Pub-
lished by Cassell & Co. Price, \$2.

This is a translation of M. Hospitalier's
well-known and oft-quoted little work enti-
tled "Formulaire Pratique de l'Electricien." Mr.
Wigan, moreover, having made addi-
tions which considerably enhance the already
great practical value of the original matter.
The main portion of the book has been care-
fully compared with M. Hospitalier's edition
for 1884, and almost all the additional infor-
mation contained in that edition has been
embraced. Those who have at any time
devoted themselves to electrical engineering
will readily appreciate the value and con-
venience of some small book in which they
could easily find constants, formulae, methods
and other practical information in a concise
form, and to these we cheerfully recommend
Mr. Wigan's work. The favorable reception
accorded to M. Hospitalier's "Formulaire,"
moreover, fully warrants the assumption that
the translation will rapidly gain popularity.

PICTURESQUE SKETCHES, comprising Architectural
Sculpture, Statues, Monuments, Domes, Foun-
tains, Cathedrals, Ironwork, Details of Ornament,
&c. 36 plates, oblong, 9 x 15 inches, contained in an
envelope. Published by James R. Osgood & Co.

The scope and contents of this collection of
sketches, which have been printed by the
heliotype process, are so fully indicated by
the comprehensive title given above that
little remains to be said of them. The en-
gravings are reproductions from pen and ink
sketches, and are mostly well done. The work
is a desirable addition to every architect's
library, and designers generally will gain
useful ideas from it in working up the vari-
ous studies upon which they may be engaged.
Some of the illustrations have already ap-
peared in the current issues of the *American
Architect and Building News*. There is no
letter-press accompanying the designs save
the individual captions. These are very
brief, but, for the most part, give the name
of the authors of the designs to which they
are affixed.

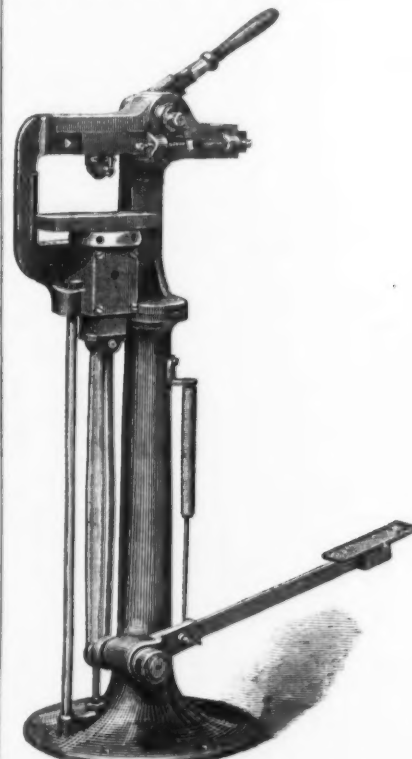
PROTECTION AND FREE TRADE TO-DAY. By Robert
F. Porter. Size, 7 x 5 inches, 48 pages, pam-
phlet edition. Published by James R. Osgood &
Co., 1884. Price, 10 cents.

The general plan of Mr. Porter's argu-
ment is epitomized in his first sentence, as
follows: "The arguments for or against
free trade or protection can no longer
depend upon the theories of political econo-
mists, but must rest upon a foundation sup-
plied by the records of national progress
during the last half century, and a study of
the existing conditions of industrial popu-
lations." Drawing his conclusions from pre-
mises established in the figures of census re-
ports and the statistics of trade returns, his
arguments will prove very difficult of refuta-
tion. Instead of theorizing or moralizing
over what should be, Mr. Porter boldly
brings forth statistics showing the present
condition of the two free trade countries,
Great Britain and Holland, and contrasts
them with the United States, Germany and
France, and it is hardly necessary to add,
to the great disadvantage of the former
countries. Describing a trip through Eng-
land, he presents a most graphic picture of
the destitution and misery so prevalent
among the laboring classes there, and shows
how the free-trade cry, "If one industry
does not pay, try something else," is fol-
lowed to the ultimate choice for many be-
tween the almshouse or a protected country.
Where an argument is sustained by citing
the condition of country in which a certain

tariff policy has prevailed for many years
uninterruptedly, it is often replied to by the
statement that the condition of the country
was not due to its tariff policy, but rather
to its natural advantages, disadvantages or
similar causes. In view of this fact, Mr.
Porter's presentation of the industrial pro-
gress made by Germany since returning to
protection in 1880, together with the better
condition of the laborers as regards number
employed and higher wages paid, is of pecu-
liar value, as it shows the effect of the
two policies under as near like conditions as
is possible. If men would but allow them-
selves to be convinced as much by their
reason as they are by their prej-
udices, this little pamphlet would meet with
signal success in gaining converts to the doc-
trine of protection.

Improved Marking Mach'n.

The accompanying engraving shows a
machine which will no doubt favorably
commend itself to tool-makers and manu-
facturers generally, being designed for stamp-
ing letters, numbers, trade-marks, &c. Roller
dies may be used on flat surfaces or
flat dies on work of cylindrical form. The
die is fastened to a sliding carriage or rack,
and is made to traverse work by a hand-
lever, and is brought to bear on the work by
a foot-lever, the work being held on the
table by suitable fixture. This is very
clearly shown in the engraving. The ma-

**Stamping Machine for Marking Numbers,
Trade-Marks, &c.**

chine has horizontal and vertical adjust-
ments, and is mounted on a column of con-
venient height, making one of the handiest
tools of its kind in the market. It is now in use
by a large number of manufacturers for mark-
ing taps, dies, twist drills, axes and hatchets,
skates, files, &c., and, while sufficiently
strong to mark work to the necessary depth,
it is delicate enough for fine tools. It will
mark an uneven surface to an even depth,
and it is claimed that a much sharper and
nearer die can be used than in a drop or
hand stamp.

The tool weighs about 250 pounds, and is
placed on the market by Mr. Dwight Slate,
262 Main street, Hartford, Conn.

Foreign Trade of Victoria, Australia.

—The imports into the colony of Victoria
during the past year, according to official
returns from Consul-General Spencer, of
Melbourne, amounted to \$36,400,000, a de-
crease as compared with the previous year
of nearly \$5,000,000. The decrease in the
imports is to be attributed rather to an over-
stocked market than to a diminution in the
volume of trade, and occurs principally in
cotton, woolen, silk and linen piece goods,
metals, and including wine, wool and tea.
The exports during the past year amounted to
\$79,800,000, being the largest export in the
history of this colony. According to the
official statistics the export trade divides
itself under the following heads: Produce
and manufacture of the colony, \$64,686,949;
foreign and other colonial produce, \$15,118,-
118. It should be observed, however, that
large quantities of wool from the Riverina,
New South Wales, amounting in value to not
less than \$6,000,000, are entered out as
Victoria wool. Taken as a whole, the trade
of Victoria for the year 1883 was quite
satisfactory. The metal and coal imports of
Victoria were as follows in 1883, as com-
pared with 1882:

	1882.	1883.
Metals, including wire.....	\$4,289,506	\$9,962,659
Manufactures of metals, in- cluding machinery, hard- ware, &c., ammunition, &c.	4,077,553	5,188,567
Sewing machines.....	579,897	577,259
Jewelry, watches, clocks, plate, plated-ware, instru- ments (scientific, &c.).....	1,227,555	1,347,318
Coal, coke, shale.....	1,737,423	1,875,739

Water-Pipe Contract.—At Pittsburgh,
on the 4th inst., bids were opened for furnishing
special castings and 12, 15, 16 and 20
inch water-pipe to be used in extending water
to the Southside. Five bids were received,
the lowest being that of the Cincinnati and
Newport Iron and Pipe Company. Their
proposition was to furnish all the pipe at
\$24.20 per ton, and the castings at \$50 per
ton. The contract will amount to about
\$35,000, independent of laying the pipe, and
the distance to be traversed is 14,400 feet.

Count de Lessers and the commission
have completed their examination of the
Suez Canal at Ismailia, and approved the
plans for widening the waterway.

NEW AND IMPROVED BUFFALO CUPOLA & FORGE BLOWERS



All Sizes
and Styles,
for Every
Possible Duty.

The Most
Positive,
Durable and
Economical
Made, and
GUARANTEED TO GIVE
PERFECT SATISFACTION

BUFFALO FORGE COMPANY,
BUFFALO, N. Y.

SNELL MANUFACTURING COMP'Y.

ESTABLISHED 1790.

FISKDALE, MASS.

IMPROVED

SHIP AUGERS

AND
SHIP AUGER BITS.

Superior to any ever before made. Every
Auger and Bit Warranted.

ALSO MANUFACTURERS OF

Boring Machines, Boring Machine Augers,
Carpenters' Augers, Car Bits.

Russell Jennings' Pattern Auger Bits, Kentucky Post
Augers and Rafting Augers.

SNELL'S SUPERIOR EXTRA

Cast Steel Auger Bits.

Medals and First Premium Awards of Massachusetts, 1841,
1848, 1-50, Centennial Exhibition, Philadelphia,
1876, International Exhibition, Paris, 1878.

The Snell Car Bits are used by all the large Car Manufacturers
of the United States. They are superior to all others in quality,
and enjoy the highest reputation.

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SOLE AGENTS,
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LOCKPORT, N. Y.

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PULLEY BLOCKS & TRUCKS.**

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AT CHICAGO EXPOSITION.

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PATENT
SAW SET
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GUMMER.

Four perfect sets com-
bined in one.

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CITIES, TOWNS AND MANUFACTORIES

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Patent Tube and Gang Well System.

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233 Broadway, New York.

Infringers of above patents will be prosecuted

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Brass Smelter & Refiner.

Ingot Brass for Car Bearings a specialty

Brass washings for bell makers always on hand.



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OX SHOES.

The Best Ox Shoe in Market.

ALL SIZES.

THE PARAGON PRUNING SAW,

WITH
Convex and Concave
Cutting Edges.



Patented
April 1st, 1884.

THRUST CUT ON THE CONVEX EDGE.

DRAW CUT ON THE CONCAVE EDGE.

A Fair Trial will Demonstrate that this is the best DOUBLE-EDGED SAW for Trees or Vines.

WHEELER, MADDEN & CLEMSON, Middletown, N. Y.

VIRGINIA NAIL AND IRON WORKS COMPANY,

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NAILS and Bar Iron of Superior Finish, made exclusively from Pig Iron.

Crawford's Patent Adjustable
Screw Holder and Driver
COMBINED.



Price, per doz. 4-in., \$6.00; 6-in.,
\$7.50; 8-in., \$9.00.

SEND FOR CIRCULAR AND DISCOUNTS.
Chicago Screw Driver Works,
83 East Erie St., Chicago, Ill.

WHITE MOUNTAIN FREEZER CO.

Manufacturers of

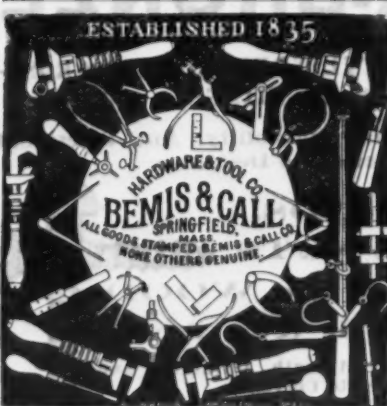
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White Mountain Ice Cream Freezer.

The only Freezer ever made having three distinct
motions, thereby producing finer, smoother Cream than
any other Freezer on the market. Acknowledged by
every one to be the best in the world. Over 300,000
in use to-day. Outside Irons Galvanized, but all inside
the can coated with Pure Block Tin. Tubs water-proof;
easily adjusted and operated. We also carry large stock
of Packing Tubs, Packing Cans, Ice Crushers, &c. Send for
Price List and Trade Discounts. Address



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The Largest Manufacturers and Dealers in Stones for

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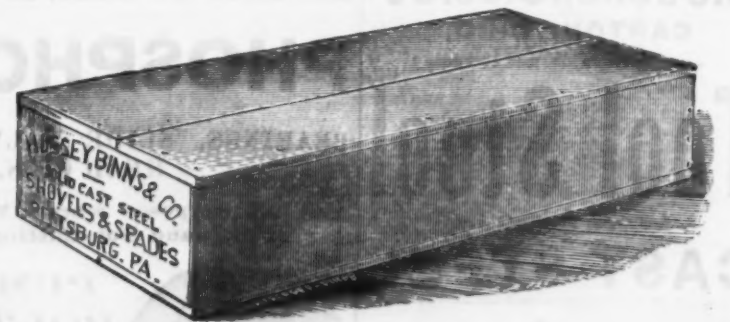
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End), Lamotte, Black Dia-
mond, Magic Green, Mount-
t-in. All kinds brande-
with our name are genu-
ine.

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stan and Sandstone
Razor Hones, Vienna
Clear-shape.

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Quality and Prices guaranteed. Send in your orders.



One Dozen (Box), No. 820, Opened Ready for
Sale in Store.



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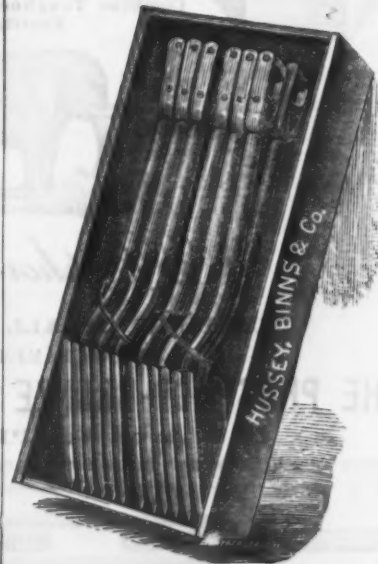
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BINNS
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DURRIE & McCARTY,

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GALLOWAY BOILER

IMPROVED UNDER PATENTS OF 1875 AND 1876.

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MANUFACTURERS OF

Pig Iron, Steel Nails, Blooms, Billets, &c.

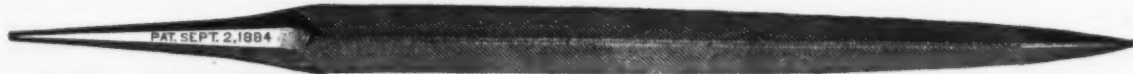
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BELLAIRE, OHIO.

DURRIE & McCARTY, 97 Chambers St., New York, Sole Eastern Sales Agents.

New American File Company,

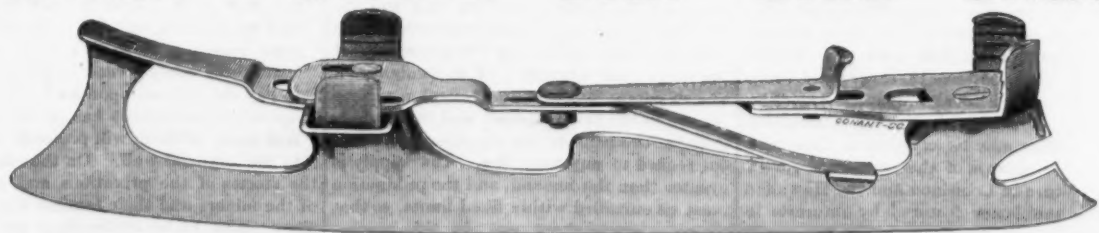
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Send for Illustrated Catalogue and Price List.

Chinese Iron Foundries and Rice-Pan Casting.

Although the Chinese, as a race, are incapable of the deep thought and extreme mental effort required to elaborate the intricate details of modern scientific machinery, or to plan those bold enterprises and expensive systems of road and hydraulic engineering which are the pride and glory of the civil engineer, yet, *per contra*, it must be conceded that for finicking, tedious, patient ingenuity of a certain sort the Chinaman stands almost without a rival. As a notable example of this same patient, plodding ingenuity shown by the Chinaman in some of his trades and industries a writer in the *Chemical News* cites the manufacture of the very thin cast-iron rice-pans which may be seen in almost any cook-house in Hong Kong. The principal seats of this industry are at the towns of Sam-tiu-chuk, and Fatshan. This latter town is distant but some 12 miles, in a southwesterly direction, from the provincial capital of Canton, and has, from the extent and importance of its trade and manufactures, notably its great trade in iron goods, tools and hardware, been aptly termed the Birmingham of China. The previously-mentioned town of Sam-tiu-chuk is inhabited principally by Hakkas, and is one of the principal towns of the sparsely-populated and mountainous district of Kwei-shui. The iron used is obtained by smelting the magnetic oxide which is found in large masses in the mountains surrounding the town. The ore is broken up and smelted with charcoal in a primitive smelting furnace or cupola some 8 feet high; the cupola is cone-shaped, having its apex or smaller diameter at the bottom; the single tuyere pipe is of earthenware, the opening for emission of the blast being placed downward. The furnace itself is of earthenware, or rather puddled and dried clay, kept from falling to pieces and strengthened by hoops and longitudinal straps of iron; the whole is lined with clay several inches thick; the internal diameter at the bottom may be about 2 feet, or perhaps a little more, and at the top about 3½ feet; inside depth, about 6 feet.

The blast is produced by a rude, yet most ingeniously-contrived, bellows formed of a wooden box some 5 feet long by 3 feet in horizontal and 1½ feet in vertical section. This box is divided longitudinally into two compartments, each 18 inches square in vertical section, in each of which compartments a piston works; the valves are so arranged that one piston is effective in the up stroke; the other in the down, or rather return, stroke—for the machine is arranged horizontally. It will be seen, however, from this arrangement, as there is no air chamber, that the blast is not perfectly continuous, there being a slight cessation at the end of each stroke before the return stroke can be effective. The fuel used is charcoal, and the furnace being first heated by starting a fire with fuel alone is then filled up with alternate layers of charcoal and ore in small fragments. The blast is urged, and after a sufficient time has elapsed the molten metal is drawn off from a tap-hole at the bottom in the usual manner and cast into ingots, which, when intended for export, are afterwards reheated in an open forge and beaten into blooms of about 6 pounds in weight; these may occasionally be seen for sale in the irondealers' shops in Hong Kong, and when made from genuine native iron fetch a very high price indeed, as much as \$4 per picul or even more being sometimes paid for the best quality made from the black or magnetic oxide. The Fatshan iron, which to a great extent comes from Ying-tak (a town on the West River) is smelted from hematite (the red oxide), but mixed to a considerable extent with gangue, rarely pure, and of varying and uncertain chemical composition. The iron smelted from this latter ore, although far more valuable in the native estimation than foreign imported iron, does not realize so high a price in the market as the other.

For making the very thin rice-pans, which are cast without handles, pure native iron alone can be used, as, being smelted with charcoal, it has the property, when melted, of being more fluid than iron smelted with coal, or it may be that the iron itself, being uncontaminated with sulphur or phosphorus, possesses the property of greater fluidity on this account. The molds in which the pans are cast require weeks of tedious and patient labor to bring them to perfection. They are composed of two parts—an upper and a lower—and are made of carefully puddled clay, the upper portion about 1½ inches, and the lower somewhat thicker; the lower or under half is full of round holes about ½ inch in diameter, which pierce about two-thirds the thickness of the mold; these holes are made in order to allow the clay to dry thoroughly; the molds are turned true on a revolving potter's table of the usual pattern, and when quite dry receive a final coating of fine molding sand, and are made perfectly smooth. The two portions of the mold are then luted together with clay and placed in a large, round oven some 6 feet or more in diameter. The pans are cast bottom upward, each mold having a runner, but no riser; the upper portion of the mold has three little legs in order to support it when drying, previously to the two molds being luted together. After being placed in the oven, which is some 2½ feet deep, the molds are surrounded with charcoal, which is fired, and the ovens closely covered with a curiously constructed earthenware, or rather dried clay, cover, kept together, as in the case of the furnaces or cupolas previously mentioned, with bands and straps of iron. The process is so timed that by the time the molds are at a bright red heat, or almost white heat, the iron in the cupola is melted and ready for tapping; the molten metal is then run out into ladles made for the purpose, and quickly poured into the molds. When these are all filled, the cover of the oven is readjusted, and the whole left to anneal or cool gradually.

The great secret about this process, which enables the Chinese foundries to cast their iron pans of such large diameter, yet so thin and light as to be scarcely thicker than a sheet of paper, appears to be the use of highly-heated molds, and pure iron smelted with charcoal. When the ovens and their contents have cooled down, which takes

about two days, the luting attaching the upper portion of the mold to the lower is carefully removed, and, the molds being separated, the pan can be extracted; when the operation has been successful the same mold can, with a little touching up, be used several times. The pans now have each attached to its bottom a runner or lump of iron of greater or less size, which, from the extreme thinness of the pans, making them but little less brittle than earthenware, requires the greatest care in its removal; these runners are carefully sawn off, the use of the more expeditious cold-chisel being more likely to cause fracture than the slower, but steadier, saw; the edges are smoothed down, and the pan is ready for the export market. Handles are attached to these pans by the retail dealers, who bore holes near the rim of the pan and attach small ribbons of iron for the purpose of handles.

The pans made at Fatshan differ from the preceding in being cast with handles attached near the rim to the inner surface of the pan, which necessitates the breaking of the mold at each casting, it being rare for the same mold to be serviceable a second time. The Fatshan pans are also usually cast much thicker and heavier than those of Sam-tiu-chuk, and occasionally as large a proportion as one-third of foreign cast iron, generally Kentledge or ordinary pig iron, is mixed with native iron for casting. In other respects the process followed at both places is the same. The Fatshan pans, being thicker, are the more durable of the two, while the thinner Kwei-shui pans are more popular with poor people, because, being thinner, a less quantity of firewood is required to heat them through. The manufacture of iron rice-pans is in Kwangtung Province a Chinese Government monopoly, which is farmed out by the salt commissioner, and by him licenses are granted to the local iron foundries on payment of a heavy fee. Considerable care has to be used in packing the pans for export, in order to prevent breakage, which, however, frequently occurs when any considerable number of pans are shipped to Australia or other distant ports. An attempt was made some years back to cast rice-pans in Hong Kong, but the locality chosen, Shau-ki-wan, being an unhealthy one, many of the workmen died, others left the place sickly and fever-stricken, and the concern from this cause mainly proved a failure. It may, however, be possible that had a longer time, say a year or more, been allowed to elapse for the newly filled-in ground to settle down, and the freshly-cut hillside adjacent to finish giving off its malarious exhalations, the place would not have been so unhealthy, and in that case the result might not have been so disastrous to all concerned as it unfortunately proved itself to be.

Activity Among Virginia Furnaces.

The last issue of the *Virginian* says that the Virginia coke-using blast furnaces, those that may properly be called large modern live ones, are all now in blast. The two at Longdale, of the Longdale Iron Company, are so steady-going "in blast" that it is looked upon as a matter of course that they should be in blast, as they are; Victoria Furnace, of the Iron and Steel Works Association of Virginia, having been thoroughly repaired, has now been in blast for several weeks, improving on her former record of output. Low Moor Furnace, of the Low Moor Iron Company, of Virginia, after being idle for three months, for complete refitting, went into blast again November 17, and is working finely. These three are on the line of the Chesapeake and Ohio Railway; they make about 300 tons of iron a day.

Gem Furnace, of the Shenandoah Iron Company, has recently been put in good order and is working satisfactorily; Crozer Furnace has only recently gone into blast after a thorough repairing which added to its efficiency; these are on the line of the Shenandoah Valley Railroad; they produce about 175 tons daily.

Princess, the new furnace of Capt. D. S. Cook, on the Richmond and Alleghany Railroad, is just ready to be lighted up as we write this. If good looks, good surroundings, and good prospects entitle a furnace to be called a "princess" then this one is rightly named; it will probably make about 30 tons a day. Callie, near the Princess, is the only one of the Virginia coke-using furnaces recently in blast that is now out.

The Iron Mountain Company are pushing the erection of their works at Durango, Mexico. The foundry and machine shop are completed, and the blast furnace is expected to be in operation early in 1885. The stack is of stone, 56 feet high, and will be lined to a bosh diameter of 10 feet. There are now en route two carloads of machinery, and other portions of the equipment are contracted for and will soon be shipped. The furnace will be blown by a Weimer engine, and the tunnel fitted with a Weimer top and gas seal. For the present the boilers will be used for both furnace and machine shop. As soon as the blast furnace is completed, the company contemplate the erection of rolling mill, &c.

An article recently published in the *Baltimore Sun* gives an interesting history of the Cumberland coal-mining region the fluctuations of prices for mining and the relations of the Cumberland and Clearfield regions as competitors for the same markets. During September, 1864, \$1 per ton, worth about 40 cents in gold, was received by the miners, and during the depression of 1878 they received 40 cents. The "boom" year of 1880 sent their wages up to 65 cents per ton, from which, in 1882, they receded to 50 cents. On December 1 they stand again at the figure of 1878.

The work of constructing the grain elevators, at Montreal, for the Montreal Terminal Company is reported to be now well advanced, and will be continued during the winter. The walls have been raised to a height of about 12 feet, and are 6 feet thick on the river front of the building, and are composed of a hard and heavy stone, well fitted to resist the force of floods and ice shoves.

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A Proposed Industrial Federation.

We observe that the Eastern Pig Iron Association has taken the initiative in the formation of a tariff club which is to embrace all the manufacturing industries of the United States. At a meeting of the executive committee of the association, held in Philadelphia last week, a sub-committee was appointed to prepare an address to be issued to manufacturers all over the country, calling upon them to join the club. The members of the sub-committee are F. A. Comly, president of the Andover Iron Company; W. A. Ingham, president of the Rock Hill Iron and Coal Company, and H. S. Eckert, president of the association, and a very prominent manufacturer of Reading, Pa. It is understood that the scheme of uniting the industries of the country into a grand federation originated with one of the members of the committee, and it is therefore very appropriate that to his hands should be intrusted the preliminary work, upon which in undertakings of this character almost everything depends. If sufficient interest in the project can be awakened among representative manufacturers in other industries to cause them to take hold of it heartily, and they help to push it forward, the proposed club can be made a formidable power for offensive or defensive purposes, while through its innumerable ramifications the people of the country generally could be reached and educated in protective doctrines.

The plan of the proposed organization has not yet been announced, so that we are in the dark as to its system of membership, but if it is to be modeled after the Cobden Club, as reported, members will be taken from the various industries indiscriminately, and it will have no connection with other organizations. The Industrial League, which has

its headquarters in Philadelphia, is a national tariff association, composed of representatives from various trade societies, and differs from the Cobden Club in that respect. The field of the Industrial League would be invaded by the new club proposed, but that may be a necessity, as the league has been so long inactive that, if not dead, it is exhibiting no signs of life.

In an industrial federation such as is here proposed there are conditions which operate against a sustained existence. If the organization is composed of members of every industry, and its aim is the propagation of protective-tariff doctrines, it will have a very wide field before it in which to labor most diligently. Not only must such sentiments be thoroughly disseminated in most of the Congressional districts, but the schools and colleges will have to be carefully looked after in order to control economic instruction from the very beginning. This is a huge work, but, vast as it is, it should not be neglected by a society organized as a propaganda. As a Member of Congress is only elected for two years, when tariff work is confined to Congressmen it has to be very frequently repeated. If the people were convinced that protection is the true national policy, however, Congress would but reflect their wishes and could safely be left to legislate on tariff questions. Educational work of this character would necessarily be slow. It would require the payment regularly of considerable sums of money by every manufacturer to cover necessary expenses. The result of this outlay not being apparent for several years, it is unlikely that contributions for the purpose would be made more than one or two years by the great body of members. Americans want quick returns. If they, instead of the English, had been conducting the Cobden Club, the failure to effect an impression on American legislation of any consequence, after so many years of persistent effort, would have made that club as quiet as the Industrial League has recently been.

If, however, the work of propagation is not the primary purpose of the proposed association, but it intends to take a hand in shaping tariff legislation, it is entering a field already occupied by a number of special organizations, no one of which would intrust its interests to a general society. Would the National Association of Wool Manufacturers descend from its very prominent position, acquired through long years of service at Washington, and now being recognized as the exponent of the wool manufacturing interest? Would it permit a general tariff club to take its place in the front? Would the American Iron and Steel Association consent to be pushed into the background? Would the silk manufacturers merge their association into a general body, or the potters, or the carriage manufacturers, or the cotton manufacturers, or would any of the other organized trades abandon the separate efforts they make whenever Congress attempts to legislate on matters touching their special interests. Individuals do not always trust to the wisdom of their own trade organizations, but often engage in tariff work on their own account, and each trade association will prefer to manage its own business, rather than trust everything to a general club. Will manufacturers help to support two organizations—their own association and the grand federation proposed?

Another object is mentioned in connection with the proposed club, which is to exercise watchfulness over imports, and to see that everything brought into this country pays the proper duty. Persons are to be employed for this purpose, who will be located at the principal ports of entry. There is perhaps no more inviting field than this for intelligent work. The reports to the Treasury Department made by special agents show that goods are frequently undervalued, and that not only does the Government lose much revenue in this way, but American manufacturers are deprived of the full measure of protection accorded them by the laws. Defects of this kind in customs practice should be corrected, but how are they to be reached by private persons having no authority, when it is quite evident that the officers of the Government are diligent in ferreting cases of this kind, but are powerless to prevent their recurrence? An increase in detectives may be a good thing, but if laws are defective swarms of detectives will not prevent the commission of crime.

It occurs to us that the grand scheme of "unifying the influence and interests of American industry" should begin nearer home than is proposed by the Eastern Pig Iron Association. The efforts of that association should first be devoted to the unification of the iron trade. The pig-iron manufacturers should endeavor to restore harmony to the councils of the great industry of which they only form a part. A manufacturer of pig iron should be able to greet a manufacturer of steel with cordiality. They are both interested in the future of American industry, have an equal stake in the settlement of economic, financial and social questions, and should by all means compromise any differences they may have, and decide to pull together. If the Eastern Pig Iron Association is anxious to go into the unification business it has an excellent chance among its immediate neighbors. Having accomplished this, it can most advantageously extend its work by promoting the organization of strong non-partisan tariff clubs in the various Congressional districts, each pledged to keep a watchful eye on its own

representatives in the Senate and House. We are aware that there is very little glory in work of this kind. Those who do it will have no occasion to come prominently to the front. By so doing they will only invite hostility and encourage vigorous and organized work among those opposed to protection. We would remind them, however, that battles are not won by staff officers in gold-lace embroidered uniforms, nor by brass bands under the leadership of gorgeous drum-majors, but by soldiers who do their duty without praise or the hope of fame; and that more may sometimes depend upon a solitary picket or vidette than upon a whole tentful of major-generals. We make these comparisons without disparagement to major-generals, staff officers, brass bands or drum-majors. These have their uses, but in serious campaigning it is companies and regiments which count. If we have a company of loyal minute men in every Congressional district, and a regiment in every State, the experience of the anti-protection forces will be very much like that of the British regulars at Lexington.

Uniting American Commercial Interests.

The signs of the times point to a change not far distant in our trade relations with foreign countries, particularly those of the American continent. Isolation is not favorable to our highest prosperity. In prosperous times we can more easily subsist within ourselves, but in periods of depression, as at present, our manufacturers and producers of every class feel a pressing need of markets abroad wherein to dispose of the surplus production of "plow, loom and anvil." Commissions are appointed and treaties of commerce are being negotiated with the single design of opening up to American enterprise the markets of the world. Just now there are treaties pending with Mexico, Spain, San Domingo and Nicaragua, respecting some of which we are likely to have heated controversy in the debates of Congress. Certain references to those measures contained in President Arthur's message excite the liveliest interest. Moreover, Canada is restive under her exclusion from the privileges of commercial reciprocity, and not a few on this side of the Dominion boundary question gravely whether our relations with our neighbors beyond the St. Lawrence are such as to contribute in the highest attainable degree to the general prosperity. As openly acknowledged by Sir Alexander Galt, formerly prominent in Canadian politics, who was in this city last week on his return from England, "Canada is only too anxious to make 'reciprocity treaties with other countries,' and especially with the United States," and it is not improbable that prospective changes in the administration at Washington encourage the friends of reciprocity in a belief that overtures from either side in favor of closer relations would be more favorably received.

Assurances are given that San Domingo is anxious to arrange a reciprocity treaty with the United States, with the object of effecting a more general interchange of products. Mr. Billini, Dominican consul-general at New York, a brother of the newly-elected President of the Republic, says large amounts of capital in the sugar interest are being transferred from Cuba to San Domingo, and we may reasonably expect that both of those countries will soon become more closely identified with the United States in all that affects their material progress. In regard to the Spanish-American treaty, as of that with Mexico, a very hostile opposition may be expected in Congress, and mainly because of the antagonism with sugar culture in Louisiana and the Hawaiian Islands, the latter fostered by interests in the Pacific States. Scarcely less bitter will be the hostility of the tobacco growers and manufacturers. A leading merchant in this city says: "We are placed in this kind of a situation, that the sugar interest of Cuba must break down our sugar industry and their sugar must come in free. With regard to cigars, the present duty on which is \$2.50 per pound and 25 per cent. ad valorem, the treaty will just simply ruin all the finer manufactures of cigars in this country, as sure as can be. It would kill the Key West manufactures immediately." On the other hand, many of the American sugar refiners are not averse to a measure calculated to reduce still further the cost of the raw material, and steamship owners will look for an augmented volume of ocean freight.

Respecting the proposed treaty with Nicaragua, the official communications thus far vouchsafed convey significant intimations that the United States design to secure a foothold on Central American soil sufficient to guarantee independent interoceanic communication, irrespective of the possible failure or success of the De Lesseps canal scheme, so that in no future political complications in which France may be involved shall the highway of commerce forming substantially a part of our coast line be liable to disturbance, or the means of transit be used prejudicially to American interests. In other words, the opportunity seems to present itself for a reassertion of the "Monroe doctrine," signifying "hands off," as regards future European design on this continent.

Inasmuch as the purpose of these treaties is thus far but imperfectly understood, it would be premature to say that they are entitled to the support of our manufacturing interests. They undoubtedly look to a closer commercial union with our cisatlantic neigh-

bors, and are an important advance in that direction. We may also notice the tendency toward the substitution of special treaties for a general tariff in attempting to regulate the multifarious details of our foreign trade. Though not less cumbersome, they are more elastic, such treaties admitting of a nicer adjustment in their minutiae to the demands of interests which in a special sense may be local and exceptional, thus avoiding the necessity of disturbing the whole system by frequent amendments, called for by constantly changing conditions.

The Anthracite Coal Trade.

Manufacturers of anthracite pig iron and other consumers of anthracite coal will be interested in the rumor now circulating that the coal companies propose to adopt a different policy with the coming of the new year. At first blush it might be supposed that they intended to reduce the price of coal to their manufacturing customers, to enable them to compete on more equal terms with the manufacturers of other districts, where coal and coke are furnished cheaply. A second thought, however, would convince a suffering mill or furnace owner that such a procedure is among the improbabilities, the coal companies being such thorough masters of the situation. The only changes likely to be made in the policy of the companies is one that will enable them to maintain prices even more firmly than at present. The stoppage system failing to answer every purpose, it now seems tolerably well settled that the allotment plan will be tried. It has been claimed by the coal companies for a long time that there was no combination among them—they merely prevented prices from yielding under the pressure of a heavy supply of coal by agreeing, whenever they found it necessary, to discontinue mining for a fixed time, varying from a week to a month. The new plan, however, which, by the way, is a plan formerly tried and abandoned, is undeniably of the nature of a combination. It is understood that the total production of anthracite coal next year is to be limited to 30,000,000 tons, and this will be allotted to the different companies on a basis of percentages agreed upon among them. Representatives of some of the coal companies deny that such a movement is intended, but the rumor "will not down," and confirmations of it come from quarters that are highly credible.

The consumption of anthracite coal in 1885 is expected to be more than the production fixed, but it is very likely that a sufficient stock will be carried into the new year to meet the additional requirements of the market. The production in 1883 reached 31,800,000 tons, but it is alleged that the mines were then forced to a greater production than the condition of the trade warranted. At the present rate of consumption, it is believed to be entirely safe to fix 30,000,000 tons as the limit of the production of the mines in 1885.

The advocates of a combination point to the limitation of the demand, and compare it with the capacity of the mines. In one month of this year 3,500,000 tons were produced, which is at the rate of 42,000,000 tons a year if full time were made. This is more than 10,000,000 tons in excess of the amount marketed in any one year, and shows that the development of mines, the extension of mining facilities and the appliances for handling anthracite coal have been increased far beyond the necessities of the time. The advocates of a combination are, of course, anxious to prevent a serious decline in the price of coal, and their whole energies are bent in this one direction, without regard to anything else. The supply is greater than the demand, and the production must be curtailed within fixed limits, so that the price can be kept up. In this respect natural conditions are disregarded, and the anthracite coal trade is to be managed so as to yield better results than any other line of business.

It is to be regretted that the anthracite coal interests are not more diffused than they are. With the coal trade practically controlled by the carrying companies, individual operators are unable to assert their privilege of managing their own affairs. If the latter were not hampered by the former, prices of anthracite coal would undoubtedly sympathize with those of other commodities, and, ranging at much lower figures than those now prevailing, would release Eastern manufacturers from a burden which now seriously handicaps many of them in the competition with Western and Southern manufacturers who use coke and bituminous coal, which are relatively very much cheaper. There are blast furnaces now idle in the East which would be able to continue in operation if the price of coal were as low as it was in 1877 and 1878. In other industries the cost of fuel is not so serious an item as it is in the iron industry, but at such a time as the present, when the smallest economies must be looked after very carefully, the high price of anthracite coal is a burden not cheerfully borne. This is seen in the efforts to use bituminous coal wherever it can be obtained at a lower cost than anthracite and the nature of the manufacture will permit its substitution.

The resistance of the anthracite coal companies to the natural tendency of all prices is the opportunity of the bituminous coal miners and shippers. The softer and cheaper fuel is making rapid headway in directions in which its progress would otherwise be very slow on account of its objec-

tionable smoke and soot. It is coming to stay. If it can get in here now, it will be found here when business improves, and its use will increase instead of diminish. The anthracite companies propose to rely on the demand for their coal for domestic purposes, but even in that direction bituminous coal will compete with anthracite coal eventually. The demand for domestic purposes is now very far below the supply, and it will require many years for our population to sufficiently increase so as to approach an equilibrium.

In the meantime will the anthracite companies continually and persistently endeavor to keep up these temporary expedients? Experience shows that they are only temporary. A tightly-drawn combination on this same allotment system has been tried, and it would not hold together for any considerable length of time. The policy of concerted stoppages was then adopted, but it has about lost its influence. Now, the allotment plan comes into view again. Steadily, however, the condition of the anthracite coal trade must grow worse, if general trade does not improve, and, though combinations and agreements may postpone the collapse, it seems to be inevitable. The anthracite companies cannot hope to escape the general liquidation. Some of them are financially strong enough to stand the strain of reduced output and diminished revenue, notwithstanding increased expenses, but others seem to be tottering on the verge of bankruptcy, unable to meet their current obligations and ready to plunge into unknown depths at the first vigorous push from an impatient creditor. In spite of restrictions and agreements, allotments and combinations, the time may be very near at hand when a serious breach will be made in the ranks of the coal companies, and cheap coal will come tumbling through, to the relief of our local manufacturers and the discomfiture of those who are now taking advantage of their unfortunate position.

The Hocking Valley Troubles.

For more than six months the Hocking Valley coal region has been in a condition little short of anarchy. Early in June the operators in the valley asked the miners to concede a reduction of 10 cents a ton in the price of mining, making the rate 60 cents, which was refused. A lockout ensued, which has continued ever since, the operators in the meantime demanding an additional reduction of 10 cents, making the price of mining 50 cents, and joining with it a still further demand that the miners should renounce their union and agree not to attend any of its meetings. One or two of the mines have continued in operation, paying the old price, 70 cents. This contest is still in progress, though at some of the mines new men are at work. Whoever may have been in the wrong, and whatever may be the result, the lockout has been a gigantic mistake. Industry in the region has been paralyzed, crime has been rampant, want and misery have come to the homes of the miners, and heavy loss has been suffered by the operators. Mr. W. P. Rend, one of the operators who refused to unite in the demand for the reduction, is represented as saying: "The policy pursued 'by the Hocking Valley Railroad Company' taught the mine owners a lesson that will never be forgotten by them. Already it 'has cost them, directly and indirectly, over \$1,000,000, and has reduced the railroad company to such a financial plight 'that it was lately forced to borrow money 'to pay the interest upon its bonds. To the operators the lockout has proved so costly 'that many of them will probably be forced 'to the financial wall.' On the other hand, the stories of the privations and sufferings of the miners and their families are pitiable. They claim to be contending not only for wages that in the present condition of employment shall be sufficient to sustain life, but for the right to organize and maintain their associations.

We do not presume to decide whether the first reduction demanded was justified or not. The syndicate claim it was, asserting that the condition of trade and competition made it imperative if the valley was to continue to mine coal and market the product, and that at the price offered—50 cents a ton—miners can make at least \$50 a month. Without entering into the question as to the necessity growing out of the condition of the market, both Mr. Rend, the operator before referred to, and the miners deny that at the price offered living wages may be earned. Mr. Rend says: "Their wages 'previous to the reduction offered were 'scanty enough, and afforded only the 'barest subsistence. Most of them at that 'time were in a state of pinching poverty, 'as work in the region had been scarce, 'and but few of them had even enough to 'afford them the common comforts and 'decencies of life. Their lot was indeed a 'hard one, with a bitter past and a gloomy 'future. Common humanity and common 'justice claimed for them kindness and 'compassion, and condemned any act of 'cruelty that would make their severe situation one of still greater severity.' The miners assert that 3 tons a day is as much as a strong man can dig on an average. Assuming that the miner has steady work, six days a week, he will dig weekly 18 tons, which, at 50 cents, makes his earnings \$9 a week. That is a daily wage of \$1.50, and if he works 26 days in a month his earnings will be \$39. But out of this sum he has to buy his tools and pay for the repairs to

them, and buy the oil he uses in his lamp, leaving but a small income for this hazardous and disagreeable work.

But there is another feature of this struggle which, it seems to us, is neither prudent nor wise, and that is the attempt to destroy the union. If, as is alleged, the present struggle is to root out the miners' union, it is a most serious mistake. Experience has shown that, while a union may be kept out of a shop or a mill, it cannot be driven from a region or mines. It may be destroyed to-day, but it will be reconstructed and made stronger than ever to-morrow. The surrender under duress is regarded by the miner as an injury to his manhood, and the wrong that he feels has been done to him, and through him to labor, will not permit him to give up the struggle, though he may abandon it for a while. Trades unionism is here to stay. In it labor will continue to think it finds its refuge and protector. The part of wisdom is to recognize and utilize the good that is in it, and to crush and refuse to recognize, not the union, but those principles that have been proved to be detrimental to the employer. And with this recognition of unionism should come the appeal to arbitration. An attack on labor's right to organize on the one hand, and the reprisals of workmen on the other, will never bring about those conditions under which industry will be carried on with the greatest measure of success. We do not pretend to decide the questions involved in this unfortunate struggle, but we believe that if there had been simple justice between man and man these troubles would have been settled long ago. In this hour of depression justice and a spark of humanity should rule, not prejudice and passion.

Condition of Blast Furnaces of the United States, December 1, 1884.

We herewith present our monthly statement of the condition of the anthracite and bituminous furnaces of the country for December 1. From this it appears that 181 of the 447 furnaces using these fuels, or 40½ per cent., were in blast, and 266, or 59½ per cent., out of blast. Of the 225 anthracite furnaces 88, or 39½ per cent., were in blast, and of the 222 bituminous furnaces 93, or a little less than 42 per cent., were active.

The following table exhibits the condition of the anthracite furnaces on the 1st of December, as compared with their condition on the 1st of each of the six previous months:

CONDITION OF ANTHRACITE FURNACES.					
	Furnaces	Weekly in blast.	Weekly out of blast.	Weekly in blast.	Weekly out of blast.
June 1.....	100	37,972	124	37,305	124
July 1.....	101	36,940	138	36,705	138
August 1.....	95	35,144	133	35,025	133
September 1.....	98	32,564	139	32,595	139
October 1.....	96	33,539	141	32,460	141
November 1.....	86	32,049	135	31,150	135
December 1.....	88	32,963	137	31,405	137

These figures show that there has been but little change in the condition of anthracite furnaces since the 1st of September, the same number being in blast at both dates.

The following table presents the condition of the bituminous furnaces on December 1, as compared with their condition on the 1st of each of the five previous months:

CONDITION OF BITUMINOUS FURNACES.					
	Furnaces	Weekly in blast.	Weekly out of blast.	Weekly in blast.	Weekly out of blast.
June 1.....	98	48,003	127	42,901	127
July 1.....	98	47,590	127	44,211	127
August 1.....	88	46,777	134	42,704	134
September 1.....	82	42,568	142	42,978	142
October 1.....	79	40,410	146	39,139	146
November 1.....	86	43,040	138	42,992	138
December 1.....	93	48,580	129	48,197	129

This shows an increase of 7 furnaces in blast, the same increase as in the previous month. The only marked increase in any of the districts is in Alabama, 3 furnaces having been blown in. The only marked decrease is in Illinois, 3 being blown out. We have no reports for one year ago, but, as compared with the 1st of January, there are 88 anthracite furnaces now in blast, as against 109 on January 1, and 93 bituminous, as against 101 on that date.

The Secretary of the Navy, in his annual report, makes a statement concerning our navy yards which is capable of much more extended application. He says: "It appears that, instead of maintaining our yards for the advantage and benefit of our ships, the ships have dragged out a protracted existence for the benefit of the yards." In how many manufacturing establishments is this policy being carried out to-day? Are there not departments, even in some of our best-managed works, which exist from a false notion of economizing in repairs, that have now developed into the condition of our navy yards—repairing worthless or antiquated machinery or apparatus that should long ago have been superseded by something better, but which seems to be kept in use now mainly to give the repair shop something to do? We have known instances in which workmen have used appliances very carelessly, alleging that if they were broken it would give the repair shop something to do. Such a state of affairs implies laxity on the part of the proprietors or the general manager. Close oversight of details would not permit such things to happen. But the existence of the repair shop naturally made all hands more careless than if repairs had to be done by outside parties. In administration, as well as in mechanical departments, the Secretary's criticism is broadly applicable. Offices are usually created for the dispatch of business, and the highest efficiency is or should be aimed at in the details of management. But in how many manufacturing companies to-day are officials employed at high salaries who do nothing worth speaking

of? The officer is not employed for the benefit of the place, but the place is kept for the advantage of the officer. These are times when such matters should be very carefully looked after by those interested in manufacturing corporations.

The Position of Copper.

Since our last editorial on copper, early in October, there has been a gradual but uninterrupted decline. Chili copper gave way £3 in about a month, and has sunk to a level unprecedentedly low. Lake Superior copper, which since spring had steadily kept at about 13 cents, gave way to 12 cents during the first week in December. This extraordinary depreciation of the metal is due almost entirely to the enormous production that has been going on in this country during the current year. The break in London would have no doubt occurred much sooner if people in England had been fully aware of the magnitude of our output, and that about one-half of it would be shipped to Europe. On November 6 Messrs. W. T. Sargent & Sons, London, wrote: "The main features remain as before, a splendid statistical position combined with a drooping market, at the lowest prices ever known. Chili bars have fluctuated between £52. 7/6 and £54. 2/6. Strong copper has been reduced to £65 per ton. We have reason to believe that the production of copper next year will show a decline, as a result of the low prices recently ruling."

The stocks and quantities afloat for England and France were given in the same circular as follows:

	1884.	1883.	1882.
	Oct. 31.	Oct. 31.	Oct. 31.
Tons.	Tons.	Tons.	Tons.
Liverpool and Swansea stocks of Chili bars, ores and regulus, reduced to the standard of fine copper.....	22,988	27,030	22,679
Other furnace material, same ports.....	4,604	2,443	2,649
Have stocks.....	1,735	2,774	2,914
London stock, chiefly Australian.....	2,494	3,639	5,707
Chilian produce afloat, per mail and wire advices.....	8,194	10,495	11,155
Australian do, per mail and wire advices.....	1,735	432	1,705
Total tons.....	41,700	46,838	46,809

Price of Chili bars per ton..... £52.15/ £51.5/ £50.5/

The English Board of Trade returns for the first 10 months of the year show the following:

	Jan. 1 to Oct. 31—1884.	1883.	1882.
	Tons.	Tons.	Tons.
Pure in Pyrites.....	11,541	12,814	13,191
Precipitate.....	17,704	18,465	14,706
Ore.....	20,885	13,444	13,045
Regulus.....	10,000	7,923	7,193
Bars, cakes, &c.....	31,349	29,628	29,510
Total.....	81,489	82,244	77,615

Exports.
Raw (English)..... 15,807 14,000 10,525
Sheets..... 17,389 12,965 13,569
Yellow metal at 60 per cent. 9,703 9,253 9,253
Brass at 70 per cent. 3,194 2,642 2,825
Total..... 45,089 39,815 36,304
Foreign..... 9,736 9,553 10,514
Total..... 54,825 49,368 46,818

The imports of other than Chili copper into Liverpool and Swansea during the first 10 months, in tons fine, were:

	1884.	1883.	1882.
	Tons.	Tons.	Tons.
From the United States.....	585	6,352	14,645
From other countries.....	19,919	23,382	21,812
Total.....	20,504	30,334	36,457

Large as the English export was—of sheets in particular—it was unable to keep pace with the overwhelming import from this country, and the break became inevitable. Meanwhile large contracts were made in November between some mines on this side and people in England and France for the delivery of Lake and Montana copper to the extent of altogether some 37,000,000 pounds, the price of the former based on the average value in London of Chili bars during the month in which delivery was to be made, adding thereto £6. 10/ per ton, and the latter based on the best selected quotation. The Lake companies then turned round and reduced their price at New York to 12 cents, thus shutting out a return of Lake Superior Copper from Europe.

On January 1, 1883, Lake Superior copper still commanded in New York 17½ cents; on December 1, of the same year, it had declined to 14½ cents. On October 1, 1884, it stood 13½ cents, and on December 3, 12 cents, a decline in value of about one-third in less than two years. Copper and brass manufacturers in the United States cannot complain now that they do not get their copper cheap enough. They may work for the export trade under circumstances which ought to enable them to compete with Europeans abroad. To ship a portion of our output in a manufactured shape would certainly be better than the shipping of ore and matte to enrich the Swansea smelters and Liverpool commission merchants and brokers.

A correspondent, who is evidently possessed of an inquiring mind, writes us as follows:

There is one thing we would very much like to know, namely, the actual value of an iron made from 40 per cent. cinder, as compared with Thomas, Crane, South Eastern, Allentown, Rushing or any other of the leading Pennsylvania irons. In other words, we would like to know from crucible tests the comparative merit of these irons.

We should be glad to answer our correspondent's inquiry, but it would be as easy to tell him the composition of manna or the percentage of alcohol in nectar. We have been told that more or less cinder iron is made, but we cannot learn that anybody has ever used it, and we are led to conclude that its principal employment is as ballast for

Condition of the Anthracite and Bituminous Furnaces of the United States, December 1, 1884.

DISTRICTS.	ANTHRACITE.					BITUMINOUS.				
	Total number.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.	Total number.	Number in blast.	Capacity per week.	Number out of blast.	Capacity per week.
New England.....	1	0		1	160					
New York.....	40	11	2,700	29	7,415	1	0		1	285
New Jersey.....	17	4	1,090	13	3,675					
Spiegel.....	4	2	134	2	88					
Pennsylvania:										
Lehigh Valley.....	51	25	8,205	26	6,730					
Schuylkill Valley.....	45	16	3,940	29	6,155	1	0		1	700
Upper Susquehanna.....	24	9	2,154	15	2,485					
Lower Susquehanna.....	38	20	4,620	18	3,050					
Allegheny Valley.....						26	14	4,669	12	2,990
Youghiogheny Valley.....						4	2	585	2	162
Allegheny County.....						6	4	1,526	2	575
Shenango Valley.....						17	11	9,130	6	4,700
Virginia.....						28	10	5,693	18	5,087
Maryland.....						12	4	1,691	8	2,720
West Virginia.....	5	1	120	4	700	1	0		1	130
Ohio:						7	1	800	6	1,926
Hanging Rock Region.....						15	8	1,650	7	1,165
Mahoning Valley.....						18	7	2,910	11	3,970
Hocking Valley.....						15	1	130	14	2,472
Miscellaneous.....						18	9	3,810	9	3,700
Kentucky.....						3	3	1,150	0	
Tennessee.....						8	5	2,060	3	1,540
Georgia.....						1	1	600	0	
Alabama.....						10	8	4,130	2	520
Indiana.....						2	0		2	400
Illinois.....						16	4	2,800	12	9,175
Missouri.....						8	0		8	4,360
Michigan.....						2	0	500	2	580
Wisconsin.....						3	1		2	1,040
Total.....	225	88	22,963	137	30,458	222	93	43,834	129	48,197

yachts. No one we can hear of has any practical acquaintance with cinder pig, and no one seems to have had reason to desire fuller knowledge of its physical properties than a track scale will show. All that we can tell our correspondent concerning it is that, according to our knowledge and belief, it weighs on the average 16 ounces to the pound, and 2240 pounds to the ton. If we should ever learn that it is used in the arts, except for ballast and sash weights, we shall at once address the consumer and ask him for particulars—although we shall expect by return mail the gratifying assurance that we have been misinformed.

If success attends the project to pipe natural gas from the Butler County district of Pennsylvania to Youngstown, Ohio, for use in manufacturing and dwellings, it is very likely that efforts will be made to secure a supply of gas for other districts within reach. In Western Pennsylvania there are many manufacturing localities outside of the gas belt which can be supplied with this cheap, pure, cleanly, and easily-managed fuel by the construction of pipe lines of some length, but up to this time the reliability and permanence of the flow have not been demonstrated to the satisfaction of everybody. Some of the pipe lines conveying gas to Pittsburgh have been in operation for a number of years, with sufficiently good results to encourage the laying of other lines, but the connection of a more distant locality like Youngstown with the source of supply will undoubtedly quicken the movement toward the almost universal use of gas in the iron and steel works of Western Pennsylvania.

Western cities speak boastfully of the increasing volume of their direct foreign trade. St. Louis, which had only two direct importers when that city was made a port of entry in 1871, now claims to have nearly 400, and the total imports last year, including packages in bond, had a foreign value of \$4,113,213. This shows the extent to which New York jobbers and importers have suffered in the channel indicated. Chicago, in like manner, has a large direct foreign business. The imports referred to comprise iron, metals and hardware of all descriptions.

Among boatmen and others connected with the business of the New York State canals during the past season there is deep discouragement. At no time in 20 years, so they say, was business so unprofitable, and not a few are disposing of boats and horses to any who will buy them. The canals have had a grand history, but now that facilities for transportation have been so multiplied, reducing freight rates to a minimum, it will soon be seriously questioned whether they have not outlived their usefulness. Even as freight regulators they have little potency.

Close of the American Institute Fair.—The 53d exhibition of the American Institute closed in this city on the 6th inst. The managers consider the exhibition as one of the most successful which has ever been held by the Institute, though the visitors were not so numerous as they were last year. This they attribute to the combination of wet weather and political excitement which has opposed them since the opening on September 24. The number of exhibits has been large, there having been 1200 exhibitors, many of whom displayed a number of articles each. General Superintendent Charles Wager Hull said: "I can't tell you what the attendance has been, nor what the re-

ceipts are. It is calculated that after all the expenses are paid the Institute will be about \$15,000 ahead. The financial statement will not be made up for some days, and will be presented to the Institute at its meeting on the second Tuesday in January. In certain classes of exhibits the exhibition has been infinitely better than in other years, while in others it has not been so good. There have been comparatively few sewing machines this year, and of some other things with which we have been overburdened heretofore there has been nothing this year." The closing address was made by J. Trumbull Smith, of the Board of Managers. Seven hundred and eighty-four premiums were awarded, consisting of 10 special medals, 2 medals of taste, 124 medals of superiority, 172 medals of merit and 273 cash premiums, amounting to \$1032.

Retirement of Hon. D. J. Morrell.

The Bulletin of the American Iron and Steel Association thus refers to the retirement of the well-known manufacturer who has served as president of the association for several years:

The Hon. Daniel J. Morrell, president of the American Iron and Steel Association, has been in poor health for about two years, and for the larger part of this time he has attended to no business whatever except that which related to his private affairs or was wholly of a routine character. At the annual meeting of the Cambria Iron Company, in January last, he declined a re-election as its general manager, a position he had long held, and he has just tendered his resignation as president and director of the First National Bank of Johnstown, Pa. It is proper to say in this connection that Mr. Morrell informally tendered his resignation last spring as the president of this association, and that this fact was generally made known to its members. A general expression of sympathy with Mr. Morrell in his affliction, accompanied by the further expression of the hope that his health might be restored, led to a postponement of definite action in relation to his resignation. Mr. Morrell has, however, recently renewed his request to be relieved of official duties in connection with this association, and his wishes will, of course, now be respected. An early meeting of the managers will be called to choose his successor and to take such other action as the interests of the association may require.

Grievances of Eastern Pig Iron Producers.

The Eastern Pig Iron Association, composed of furnace masters whose plants are mainly in the Lehigh and Schuylkill valleys and in New Jersey, realizes that it is laboring under disadvantages which, if not removed, must result in the ultimate closing of its furnaces. It has issued a call for a meeting in this city on the 20th inst., when steps will be taken toward bringing about a reduction in the price of coal and railroad rates.

The Philadelphia Record says that the programme to be followed at this meeting has been practically agreed upon. It will then be shown that the pig-iron manufacturers in the association are wholly at the mercy of the railroad companies, and that with these corporations rests the responsibility for the condition of the pig-iron trade to-day. The association intends to make an appeal directly to the railroad companies for relief, and, if it cannot obtain it, it will acknowledge frankly to them that they are masters of the situation and that the furnaces must be closed. The members hope, however, that the railroad companies will recognize the fact that the interests of the manufacturer and the carrier are reciprocal—that the prosperity of the one depends upon the success of the other. At the present time there are 45 iron furnaces in the eastern district at the mercy of the railroads. They must get cheap coal or they

must suspend operations. They cannot compete with Southern pig iron at the ruling figures for coal, which enters so largely into their work.

To the Reading Railroad Company the appeal will be particularly directed. It will be shown to the officers of that company that a large volume of business has been taken from the road because of their high rates. Then, too, they have hundreds of thousands of dollars tied up in furnace property on their main line. Their custom was to take a proportion of the bonds of any furnace built on the line of the road, in order that manufacturers might be fostered in their territory. The pig-iron manufacturers say this was a beautiful sentiment in theory, but was not followed out in practice. They found when it was too late that they were in the grasp of a corporation that were charging them such excessive tariffs that they could not make enough profit to meet the interest on their bonds, and they were compelled to surrender to the Reading Company, who took the furnaces and shut them up. In this way the railroad company accumulated 11 furnaces, only three of which are in blast to-day, and these on royalty. There are no bids for the others, and they are likely to remain closed, and in the meantime are accumulating the costs of watchmen and attendance. But this condition of affairs is not confined to their main line, for on the different branches of their system there are 34 furnaces which have been closed by it, and at one place in New York they have an iron property which cost nearly \$1,000,000, and which has been idle since its purchase.

The Lehigh Valley Railroad also comes in for a share of censure from the iron men. Along the line of the Pennsylvania Railroad the same complaint is made, the iron men alleging that proportionately they are squeezed as much for their coke as the iron men on the other lines are for anthracite coal. The Eastern Pig Iron Association will ask the Reading Company to lower the price of lump coal at Schuylkill Haven from \$2.40 to \$1.70, and the freight from \$1.20 to 90 cents, making a total reduction on the item of coal alone of \$1. Proportionate reductions in freights on other raw materials will effect a total reduction or saving in the production of a ton of pig iron of nearly \$3, which would give an advantage to the manufacturer of pig iron in Eastern Pennsylvania that would enable him not only to compete with the Southern iron, but to offer iron to the builder at prices that would create a demand for iron, and cause a revival in those channels of industry into which iron enters. Estimates have been prepared by some of the most experienced manufacturers in the association, and these will show that the average cost of freight to the manufacturer at such industrial centers as Reading, Allentown and Harrisburg, and which are the central points of the district embraced in the Eastern Pig Iron Association, is \$6.39 for every ton of iron produced. This does not include the freight upon the manufactured article to market. Nor does it include labor; interest on investment and numerous incidental expenses, which in the aggregate are nearly twice as much as the freight item. A leading pig-iron manufacturer declared on Saturday "that the railroad companies are beginning to see the fallacy of their policy; and I believe that when the petitions from the Eastern Pig Iron Association are laid before them they will give the question proper consideration, and will make some concessions to the pig-iron men, even if we do not get all that we ask."

The Iron Molders' Society of Melbourne have invited delegates from each of the trade societies to confer with them as to what steps shall be taken to have a duty imposed upon all imported goods which might be made in the colonies. The reason of this is said to be that the Iron Molders' Society are in fear that the Harbor Trust will send an extensive order for machinery to England, instead of having it executed there.



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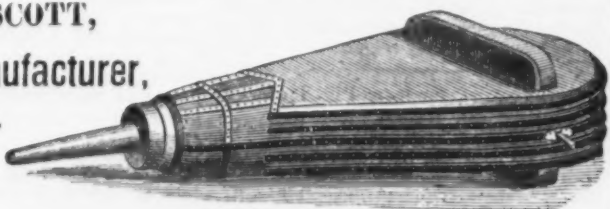
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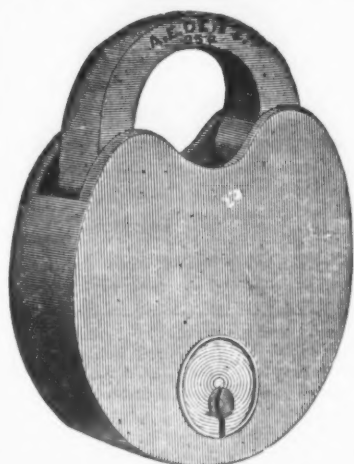


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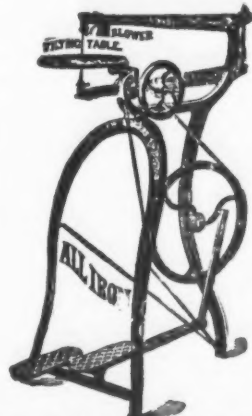
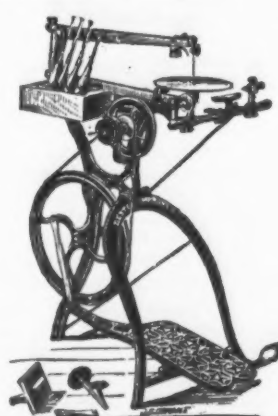
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Trade Report.

Philadelphia.

Office of The Iron Age, 230 South Fourth St.,
Philadelphia, December 9, 1884.

Pig Iron.—The market has shown great irregularity in prices during the past week, but the declining tendency appears to have been checked and bottom figures for good brands definitely established. There is no special activity, however, and buyers are as much disposed as ever to take hold very cautiously. This policy has proved successful during the past three years, and, while there cannot possibly be room for much further decline, there is nothing at present to indicate anything in the nature of a reaction; consequently, 1884 is likely to close and 1885 to open with a quiet market at about \$18 @ \$18.50 for No. 1 Foundry; \$17 @ \$17.50 for No. 2, and \$16 @ \$16.50 for Gray Forge, all delivered at tide. Special brands, as usual, command special prices, but good brands, as ordinarily understood, will be at about the figures named. Lower prices are mentioned on certain outside brands, but whatever difference there may be in price is fully offset by difference in quality, cost of delivery, &c. There is less doing in Southern Irons, and at the figures at which Pennsylvania brands can be obtained there is no great probability of serious competition from any outside source. Prospects of a more active business are by no means encouraging; consumption is light and for the present likely to remain so, as the demand for Finished Iron and other products of Pig Iron is unusually small. Still, when prices reach what are believed to be rock-bottom quotations, there is no reason for keeping back orders, and, as stocks are light, a very moderate replenishment would bring a good deal of business into the market. For a while, however, it seems as though the demand would depend upon feeling to a greater extent than usual; hence the events of the next 30 or 60 days will have an important influence on the course of the Iron market, and will, therefore, be watched with the deepest interest.

Foreign Iron.—Nothing doing, and at the moment no inquiries likely to lead to business. Asking prices are \$19 for Bessemer, \$26.50 for 20% Spiegel, and \$22 for 10 to 12%, although on firm offers these prices could be shaded a trifle.

Muck Bars.—Demand very limited and prices lower. Good quality Bars could be had at \$28 @ \$28.50, delivered—possibly less on firm offers, but there is no demand of any importance.

Blooms.—Dull and nominal at the following prices asked: Charcoal Blooms at \$52 @ \$53; Run-out Anthracite, \$43 @ \$44; Scrap Blooms, \$35 @ \$36; Northern Ore Blooms, \$35.

Bar Iron.—A very limited demand is reported, and, while prices are moderately steady, it is due more to the smallness of the orders than to their number. No more Iron would be sold if prices were two or three tenths lower; hence the futility of making further concessions. The position is unsatisfactory, from whatever point it may be viewed, but there is some hope that the suspension of work during the holidays will enable the demand to catch up a little, and thus enable the mills to start up with some degree of activity early in 1885. Meantime prices are steady at about 1.8¢ for Best Refined Iron, although what is called Refined Iron can be had at from 1.7¢ to 1.75¢ in good-sized lots, but it is doubtful if it would stand some of the tests required on first-class Iron.

Plate and Tank Iron.—There is a moderate demand for small lots, but the aggregate amount of business is but of trifling importance. Prices are irregular, and, although there is no quotable change, good-sized orders can be placed at the lowest figures of the entire year. For small lots quotations are about as follows: Plate Iron, 2.1¢; Tank, 2.1¢ @ 2.2¢; Shell, 2.5¢; Flange, 3.5¢; Fire-Box, 4.25¢; Steel Plates, Flange, 3.5¢ @ 3.75¢; Fire-Box, 4.25¢.

Structural Iron.—Orders for several hundred tons have been entered for bridge building, but the market has a very dull and monotonous appearance. One or two orders, amounting from 2500 to 3000 tons, are in prospect, but with so large an amount of unemployed capacity it is difficult to secure enough to carry them more than two or three weeks in advance. The suspension of work during the holidays may help things along for a while, but there is keen competition for everything likely to be offered. Prices weak, but nominally as before: 2.1¢ for Angles, 2.25¢ for Bridge Plate, 2.6¢ for T's and 3.5¢ for Beams and Channels, subject to the usual discount on large lots.

Sheet Iron.—There is some business doing, but the demand is of a very spasmodic character. Occasionally orders are sent in for 1000-bundle lots, but, as a rule, the demand is confined to small lots. One result of the low prices is likely to be a decrease in the imports of Sheet Iron, which, since 1879, have been of considerable importance. Several inquiries have been made during the past week from parties who have imported largely, and it is probable that prices will be made low enough to keep the orders at home. Meanwhile, for small lots, prices are about as follows:

Best Refined, Nos. 26, 27 and 28..... 3 1/2¢
Best Refined, Nos. 18 to 25..... 3 1/4¢

Common, 1/4¢ less than the above.
Best Bloom Sheets, Nos. 26 to 28..... 5 1/2¢
Best Bloom Sheets, Nos. 18 to 21..... 4 1/2¢
Common Red Plates, 8-16 to 16..... 2 1/4¢
Blue Annealed..... 2 1/4¢
Best Bloom, Galvanized, discount..... 2 1/4¢
Second quality, discount..... 2 1/4¢
Common, discount..... 2 1/4¢

Wrought-Iron Pipe.—There is a good deal of business doing in one way or another, but prices are very much demoralized. Nominal discounts are as before, but extra rates have been quoted on special orders. Small lots as follows: Butt-Welded Black Pipe, 45¢; Butt-Welded Galvanized, 30 @ 35¢; Lap-Welded Black, 60 @ 65¢; Galvanized, 40 @ 45¢; Boiler Tubes, 60¢.

Steel Rails.—There is a fair demand for small lots, but beyond that the market is neglected. Prices are steady, however, and \$28 at mill appears to be an inside figure for ordinary sections, and \$28.50 @ \$29 asked for small lots. Offers of \$27 for 1000-ton lots have been declined, and, as the mills which are in operation have two or three months' work ahead, the outlook is favorable for steady, if not improving, prices.

Crop Ends.—There is some inquiry for special makes, but buyers and sellers are apart in their ideas of value, \$20 asked and about \$18.50 bid for West Coasts. Welsh Crops could be had at \$18.50, but for that description firm offers cannot be obtained.

Steel Blooms and Slabs.—The demand is confined to small lots of Domestic. Foreign Blooms nominal at \$33 @ \$34 for Nail Blooms, and \$37 @ \$39 for Soft Basic Blooms for special uses, but no sales have been reported of recent date. Domestic Slabs are quoted from \$33 to \$35 at mill, according to quality. Bessemer Nail and Sheet Blooms, \$32 @ \$32.50, delivered.

Old Rails.—Prices are very irregular, with \$17 @ \$17.50 asked, and small lots placed at these figures, Philadelphia delivery. For larger lots \$16 @ \$16.50 is bid, with sales at about \$16.50; and for deliveries in the interior \$18 @ \$18.50 has been realized.

Scrap Iron.—Some grades of Scrap are a little more active, but there is no change in prices, which are about as follows, according to selection, point of delivery, &c.: \$19 @ \$19.50 for Selected No. 1; \$17 @ \$17.50 for cargoes; \$14 @ \$15 for Wrought Turnings; \$14 @ \$15 for Machinery Scrap, and \$9 @ \$9.50 for Borings; \$17 for Car Wheels, and \$18 for Tires.

Nails.—The market is very quiet, and prices show no improvement. Sales usually at \$2 @ \$2.05 for Iron and \$2.10 @ \$2.15 for Steel Nails.

Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue,
Pittsburgh, Pa., December 8, 1884.

There has been no important change in the business situation during the past week. Many of our manufacturers say that trade is as bad now as it was during the panic of 1873-74. Why it should be so is one of those things hard to explain, but it is so, and the only thing left is to try and make the best of it. There does not appear to be much hope for improvement before the spring trade opens up. Some of our manufacturers are inclined to be hopeful, but the great majority are disposed to be despondent. A great many are not running more than half time; some are stopped entirely; many men are out of employment, and others have had their wages cut from 10 to 20%. It is estimated that there are 20,000 men out of employment in this county, many with families dependent upon them. The Amalgamated Association, having a contract which does not expire before the 1st of June, cannot be cut prior to that time, but the indications now are that the Ironworkers will have to submit to a reduction the coming year, as they are paid much more here than the Eastern manufacturers pay for the same kind of work, who are thereby enabled to compete with our manufacturers in Western markets.

The great event of the past week was the resumption of river navigation, after a suspension of over four months. More than 8,000,000 bushels of Coal are now on the way from Pittsburgh to down-river markets, where it is badly needed. Pittsburgh Coal has been retailing in Cincinnati for some time past at from 18¢ to 20¢ per bushel, a price which the masses, in the present depressed condition of affairs, can badly afford to pay. In addition to getting this vast quantity of Coal to market, the rise will enable towboats, after delivering their Coal, to bring back empty Coal craft to be loaded, which will insure the miners work for some time to come.

Iron Ore.—The Ore trade continues badly depressed, with but little prospect of any immediate improvement. Some of our largest consumers here will close the year with considerable Ore on hand, and it is very evident that furnacemen, if they contract for a six months' or a year's supply, which is usually done in January, will expect to do so at a price much below that of the Ore they are now using. It is worthy of note that Ores for some time past have been bringing more money relatively than Pig Iron.

Pig Iron.—There has been a fair business during the past week, although the demand is almost wholly for small lots, consumers, as a rule, refusing to buy beyond their immediate actual wants. Prices, while weak, remain unchanged; well-known brands of both Mill and Foundry are selling in a small way at rates that have been current for several months, but unknown are

hard to dispose of at any price. Consumers generally prefer paying the prices for home Irons with which they are familiar to taking the chances on Irons they know nothing about, even at a reduction of a dollar or more per ton on the cost of the former. There has been no more Southern Iron offering here than usual; the best Southern Irons could not be sold here in competition with our home Irons, while the poorer grades could not be disposed of at any price. Southern Irons have been sold more or less in this market for years past; hence its offering now creates no comment. Furnacemen hereabouts think that, if they are not able to compete in their own market with Southern Irons, the sooner they sell out and quit the business the better. Quotations may be fairly given as follows:

Gray Forge Neutral..... \$16.00 @ \$16.50, 4 mos.
White and Mottled..... 14.00 @ 15.00, 4 "
All-ore Mill..... 17.00 @ 17.50, 4 "
Foundry No. 1..... 18.50 @ 19.00, 4 "
Foundry No. 2..... 15.50 @ 17.00, 4 "
Foundry Charcoal..... 22.50 @ 24.00, 4 "
Cold Blast Charcoal..... 25.00 @ 27.00, 4 "
Bessemer Iron..... 18.00 @ 18.50, 4 "

We can report a sale of 500 tons Bessemer Iron at \$17.50, cash, and 500 tons do at \$18, four months.

Muck Bar.—Continues very dull; the last sale reported was at \$28, cash, which appears to be the ruling price.

Manufactured Iron.—There is no improvement to note in the demand for Finished Iron, nor is it likely that there will be until the spring trade opens up; orders, in addition to being few and far between, are small, and manufacturers generally do not look for any change at present. Prices are still quoted on a basis of 1.65¢ @ 1.75¢, 60 days, for Bars.

Nails.—Continue very dull, as is to be expected at this particular time, and no improvement is looked for until about February 1, when the spring trade usually opens up. Nearly all the Nail mills here are idle, and are likely to remain so for some time to come. Prices are still quoted at \$2, 60 days, 2¢ for cash. Manufacturers all make the quotation in question, but it is said that some of them are selling on the sly at 10¢ per keg less. It is claimed that there is no margin for profit even at the highest price quoted, and if this is so it appears that whoever is cutting is very anxious to make sales. Steel Nails are still quoted at 5¢ @ 10¢ per keg higher than Iron Nails, but we are reliably informed that they can be bought at the same price.

Wrought-Iron Pipe.—The demand continues light, with but little prospect of any immediate improvement. Though Pipe mills are busy, it is on contracts made some time ago for Pipe for natural-gas companies. This natural-gas development was a godsend for the Pipe mills; but for it this would have been one of the worst years, probably, in the history of the Pipe business. Some of the Pipe mills have orders on hand sufficient to absorb their entire production for some time to come. Prices remain about as last quoted: Discounts on Black Butt-Welded Pipe, 45¢; on Galvanized do., 35¢; on Black Lap-Welded Pipe, 65¢; on Galvanized do., 45¢. Selected Pipe or Pipe cut to specified lengths, the discount is 5¢ less than rates above quoted. Two-inch Oil-Well Tubing, 12¢ per foot, net; 5 1/2-inch Oil-Well Casing, 46¢ per foot, net.

Steel.—Trade in Merchant Steel continues unsatisfactory, and, while prices are still quoted as before, it is probable that a desirable order could be placed below quotations. Standard brands Refined Cast Steel, 9 1/4¢ @ 10¢; do., Crucible Machinery, 5¢ @ 5 1/2¢; Open-Heart and Bessemer, do., 2 1/4¢ @ 3¢. Steel Nail Slabs, \$30 per ton, free on cars at works of seller.

Steel Rails.—Very dull. The asking price for Heavy Sections remains unchanged at \$28, cash, free on cars at mill, but it is probable that a desirable order could be placed at \$27. There have been no sales reported here for several weeks, and the outlook for the next 60 days is anything but bright.

Old Iron Rails.—The last sale reported here was at \$19, and more are offered at the same price without finding buyers. It is intimated that they might be bought for less.

Crop Ends.—Steel Rail Ends are still quoted at \$18, but there is little or no demand, and the probability is that they might be bought for less. The last sale of Bloom Ends was at \$17.50.

Railway Track Supplies.—Continue very dull, and prices are little better than nominal. Spikes, 2¢, 30 days; Splice Bars, 1.65¢ @ 1.75¢; Track Bolts, 2 1/4¢ @ 2 1/2¢.

Scrap.—Very dull, and there is so little doing that it is difficult to give accurate quotations. No. 1 Wrought nominal at \$17.50 @ \$18.50 per net ton; Wrought Turnings, \$14 @ \$15; Old Car Axles, \$24 @ \$25; Old Car Wheels, \$15 @ \$16 gross ton; Cast Borings, \$11 @ \$12 gross ton.

Coke.—The syndicate price for Blast Furnace Coke remains unchanged at \$1.10 per ton, free on cars at OVEP.

Chicago.

Office of The Iron Age, 26 and 28 Clark St.,
Cor. Lake St., Chicago, December 8, 1884.

Hardware.—The improvement in trade which was noted in our last report has developed into a fair business for the week past, though the demand was not for any special line of goods. Orders cover nearly all classes, embracing Steel Traps, Axes, Builders' Hardware, Cross-Cut Saws, Files, &c., which come into use during the winter.

In prices there are indications that on some lines there will be a decline, while on others there is a strong movement for an advance. Dealers are all waiting to note a change in prices for the better, and, should there be developments to that effect, the demand would likely be in excess of the ability of jobbers to fill from present stock. Jobbers are carrying a much less quantity of goods than has been their custom for years. Collections improved considerably during the first part of this month, and things in a general way seem to be easier, with a better feeling prevailing throughout the West. Farmers are still hopeful of obtaining better prices for their grain. They are disposing of only sufficient to meet their immediate wants, and, if January and February bring a reasonably fair price, there is every reason to anticipate a brisk spring trade.

Barb Wire.—There has been no change in the condition of the market during the past week. The demand continues very light, and prices are weakening, if anything. Galvanized is quoted at 5¢ and Painted 4¢, while there are reports that Wire has been sold at a shade less than this price. It is also stated that if makers would accept from 10¢ to 15¢ less it would materially increase the sale of Wire, but this they positively decline to do. Now and then we hear of an over-anxious seller who has met the views of the buyer, but it has not become general by any means. One of the principal causes of the decline in price in the West is the competition existing between Peoria manufacturers and Chicago. Considerable business lies in the immediate vicinity of these two cities, and to certain localities Peoria has an advantage of 10¢ in freight as compared with Chicago. For dealers here to retain their customers it becomes necessary at times to meet this difference, and thereby reduce the price on occasional sales to this extent. Mills that have to buy their Wire as a rule are doing very little, while those who draw their own Wire consider it better to run at present prices than to close up their mills. Stocks are light, and in all probability there will not be much change in price from present figures during the next two or three months.

Nails.—While dealers report that there has been considerable falling off in demand for Nails, it is yet stated that there is a fair business for the season. The rivalry which has sprung up between the makers of Iron and Steel Nails is having considerable influence upon the price of both classes. There seems to be a disposition on the part of makers of Iron Nails to retard the introduction of Steel Nails in some localities, and when a statement is made that Steel Nails can be had for the same money it frequently results in a lower price being made on Iron Nails, which is correspondingly met by the manufacturers of Steel Nails. Iron Nails are quoted in small lots at \$2.10 and in carload lots at \$2.05, 2¢, 60 days, with sales reported as low as \$2. Stocks throughout the country are said to be exceedingly light, and should there be a reaction in price there are hundreds of buyers standing ready to place their orders. A concerted movement on the part of manufacturers in refusing to sell at less than certain figures would likely have the effect of increasing trade, and encourage an improvement which cannot now be brought about by any other means. So long as makers continue to cut prices to obtain trade the market will remain weak and prices decline to a lower figure than any that has heretofore been known.

Ore.—The Ore market is beginning to assume more activity. There is at present some demand for small lots. Furnaces are buying what they need in small lots at a trifle under the regular market price. The general impression regarding the market is that it will continue weak until the opening of spring trade. There has been very little effort to contract as yet, and it is presumed that furnaces will hold off until the latter part of January or February before they make any permanent arrangement. In the meantime the Ore companies are endeavoring to secure lower rates of freight and inquiring how to reduce the cost of production. It is said that the Republic Ore Company have intimated that they will not contract for less than \$6.25 for 1885, on dock at Cleveland, their present price being \$6.50 for immediate delivery.

American Pig Iron.—The position that the market had assumed at the close of last month has not been altered during the week under review. While there has been nothing doing of importance except in carload lots, there is considerable interest manifested among consumers regarding prices for future delivery. Lake Superior Charcoal Irons are the leading brands in this market, and it is upon this class of Iron that the market for other Irons is governed. Lake Superior Coke and Ohio Black Band Irons are also firm and not in excess of present consumption. In Southern Irons there seems to have been a weakening during the past week. Some of the agile sellers have been using schemes which are calculated to deceive those who view the market from the surface, and yet give the benefit of the low price to the buyer in order to overcome the statement that the bottom price on No. 2 Foundry is \$18. In order to accomplish this they are grading a No. 2 Iron as No. 2 1/2, and furnish it to the buyer at from 50¢ to 75¢ per ton less. In conversation with a prominent buyer in this market recently he stated that it would be impossible for him to distinguish

the No. 2 from the No. 2 1/2 if they were brought to him unknowingly. The dealers who are in the market for this brand of Iron have taken to the plan of making certain offers for certain quantities and qualities, and wait their acceptance by furnaces competing for the orders. It may require a week or two before they secure the Iron, but the concessions they demand, if not unreasonably below the asking price, are usually made. Considering the condition of business in general, the market seems to be in a very healthy state, with no prospect of any material change before the close of the year at least. It is possible that our quotations could be discounted 25¢ per ton on some brands, but the generality of them will come within the scale we mention, and therefore we continue our quotations on carload lots as follows, four months. Lake Superior Charcoal, Nos. 1, 2 and 3, \$21.50; Lake Superior Coke, \$20 @ \$21; Cinder, mixed, \$19 @ \$20; Lake Superior and Ohio, mixed, \$20.50 @ \$21; Ohio Standard Black Band, No. 1, at \$21; Southern, No. 1, at \$18.50 @ \$19; No. 2 at \$17.50 @ \$18; Silvery Soft at \$17.50 @ \$19.50; Anthracite, No. 1, at \$21, and No. 2 at \$20.

Scotch Iron.—There is very little business doing in Foreign Irons at present. For such Irons as are in stock it is very light. We quote Summerlee, \$25.50, cash, from yard, and \$24.50 to arrive; Glengarnock, \$25.50 from yard, and \$24.50 to arrive; Gartsherrie, \$26 from yard, and \$25.60 to arrive. Lower prices than these have been reported from several sources, but are positively denied by those who have the Iron in this market. It is further said that there is no likelihood of lower prices being obtained, as further importation will not be made before spring, and the Iron that is now in hand should command a better rather than a lower price before that time.

Merchant Steel.—Business in this class of metal has not changed within the last week. The same old story of weakness in price and cessation of orders continues to be the general remark from sellers, and the desire to place orders on the part of purchasers has not become any stronger. The market is therefore very dull. The quietness among Plow manufacturers has considerably curtailed the demand of syndicate Steels, and it is presumed under this influence prices are somewhat below our quotations. It is said that there is a better demand for special grades of Steel and less irregularity in price. We continue the following quotations for Best Refined brands from store:

	Per pound.
Best Refined Cast Tool Steel.....	8 1/2¢ @ 9 1/2¢
Crucible Cast Machinery Steel.....	5 1/4¢ @ 5 1/2¢
Open-Heart Machinery.....	2 1/4¢ @ 2 1/2¢
Bessemer Machinery.....	2 1/4¢ @ 2 1/2¢
Open-Heart Spring Steel.....	3 1/4¢ @ 3 1/2¢
Toe-Calk Steel.....	3 1/4¢ @ 3 1/2¢
Fire-Box and Boiler Steel.....	4 1/4¢ @ 5¢
Sled Shoe Steel, plain.....	2.35¢ @ 2.40¢
" " curved.....	2.50¢ @ 2.60¢
Syndicate Steel.....	7¢ @ 7 1/2¢

Steel Rails.—We are unable to give anything for a quotation except in a nominal way, which is \$30 at mills. There is but one mill in operation here at present, which we are informed is running upon orders taken some time ago. There seems to be little or no demand at the moment, and in all likelihood will not be until after the first of the year. Newspapers during the week reported that the North Chicago Rolling Mill had again started up. We are authorized to contradict this statement. They do not know when they will begin operations.

Old Rails.—The Old-Rail market continues to be very quiet. A nominal quotation is about \$17 @ \$17.50, and it is supposed that these prices would not be accepted by holders if there was any demand. The general outlook of the Bar mills is so dull that holders of Old Rails are somewhat discouraged, and are anxious of turning their stock into money if it were possible even at prices quoted by mills that are running.

Structural Iron.—The cessation of building interest in the city and vicinity has destroyed all interest in the market for Structural Iron. For the few small structures that are being erected in the suburbs some stock is in demand from store at the following quotations, with 1/4¢ @ 1/2¢ added for delivery from stock: Beams, \$3.60; Channels, \$3.60; T Iron, \$3; Angle Iron, \$2.50; Flitch Plates, \$2.50; Frieze Plates, \$2.70.

Bar Iron.—No change has occurred in this branch since our last report. The demand continues to be very light, and those who are in want of Iron for immediate consumption are taking only such quantities as will see them through their present necessities. Best Refined New Puddled is quoted \$1.85 from store, while several brands that claim to be nearly as good are sold at one-tenth less than these figures. The consumers' idea regarding these grades, however, is contrary to that of the makers, and would likely be classed as a good grade of Common Iron. The demand for Common Iron from store is noted as being very slow and prices weak. Sellers are asking \$1.75 rates, as heretofore, but in all probability these figures are shaded from one-tenth to two-tenths. Mill prices are very irregular, and the necessity of making a sale very frequently makes prices lower than has yet been noted. We understand that \$1.45 @ \$1.50 for Common Iron at mill is not an exceptional price, and sales are anxiously sought at these figures.

Norway Bars.—The foreign Bar market is not any better than that of the American grades, and can be quoted at \$3.75 to all classes of buyers.

Trade Report.

General Hardware.

There is something of a demand for Skates and other seasonal goods, and also some activity in holiday trade, but the general condition remains one of prevailing dullness, though an increased number of small orders are reported to be coming in from travelers or from Hardware men who need the goods to complete their stock for immediate trade. Many houses have commenced their annual stock-taking, and with the near approach of the end of the year there is a general disposition to wait until the new year opens before entering to any considerable extent into new or enlarged business. Manufacturers generally are limiting to a considerable extent the production of goods, and most of them are evincing a disposition to prevent, as far as possible, the accumulation of stocks. If they succeed in this it will have a good effect toward strengthening prices the coming season and giving a good tone to trade.

LOCKS.

The Association of Lock Manufacturers met yesterday, and, after comparing views and thoroughly discussing the situation, it was decided, we are informed, to adopt a new list which should be subject to a discount of 70 per cent. and 2 per cent. additional for cash. The result of this change in list and discount will be, we are advised, a slight advance on most goods, while the low-priced goods will be furnished at somewhat reduced prices, with a view, it is intimated, to meeting the competition from outside makers on this class of goods, which has for some time been an embarrassing feature in the market. The manufacturers are still in session, but there is no reason to suppose that the action above referred to will be materially altered.

NAILS.

Trade keeps up remarkably well, considering the lateness of the season. Nails are moving quite freely, and stocks are not large enough yet to be embarrassing. This is partly owing to the favorable weather, which has enabled outdoor work to be prosecuted unusually late, and partly to the short stock carried by distributors, who are thereby compelled to replenish their assortments very regularly. Inquiries are on the market for large lots of Nails at prices slightly below those now current, but sellers are disinclined to meet the views of buyers at any but slight concessions. A somewhat firmer feeling has been imparted to the market by the advance in quotations for dock deliveries by the new Nail companies, who have evidently all the contracts they care to handle at low rates. They now quote \$2 @ \$2.05 for carload lots on dock. Store prices are mainly from \$2.05 to \$2.10, with concessions for large lots or to best buyers. Quite a fair export trade is in progress. The exporters of Nails are very favorably disposed toward the Cuban reciprocity treaty, which promises special advantages for American Nails over European Nails in Cuban markets, which take a very large quantity of Nails annually. Steel Nails are making headway in this city, more of them now being kept in stock than ever before. They sell at 5 to 15 cents more per keg than Iron Nails.

The La Belle Iron Works, of Wheeling, W. Va., have arranged with Samuel A. Haines, 88 Chambers street, New York, to represent them in this city and in the East and South generally. The La Belle Iron Works now manufacture Steel Nails exclusively.

A special telegram from Pittsburgh, received as we are about to go to press, says that the Western Nail Association met and adjourned without action. This seems to indicate that they see no remedy for present depression, and that matters must take their own course.

BARB WIRE.

Business continues quiet, under the conditions noted last week. Some orders are being entered, but they are not numerous. A little is being done in the export line. Inquiries are coming in pretty freely, but in most cases they fail to materialize, being intended mainly to feel the market. Prices are so low that a change for the better may occur at any time, and buyers therefore desire to keep themselves well posted. A movement is now on foot which may result in an advance after the beginning of the new year. The leading manufacturers have agreed not to make any more contracts for delivery after January 1. In the meantime they hope to settle upon some plan by which prices can then be advanced to living rates, and maintained there. So many of the manufacturers have expressed their willingness to enter into an arrangement of this kind that the projectors feel hopeful of its success. At present Barb Wire is selling at cost, and in many cases under it. Prices continue as reported last week, carload lots selling at 4 1/4 cents to 5 cents per pound for Galvanized Four-Point, delivered in New York, and small lots at 5 cents to 5 1/4 cents per pound. Painted Four-Point sells 1 cent per pound lower than Galvanized.

TACKS.

The manufacturers of Tacks who are in the combination have notified the trade, under date of December 1, that the guarantee of prices which they made to their customers

in their special circular No. 150, December 1, 1883, is withdrawn on and after the 1st inst., and the special circular given below, with reference to the future guarantee of prices, has been issued to the trade. The manufacturers are evidently intending to protect their customers, whether or not the present prices are maintained, a point on which no information is given at this time. The circular is as follows:

To the Trade: We make the following guarantee to customers who are, or may become, entitled to a rebate under the terms of our quantity discount sheet which took effect July 1, 1884, or under the terms of any quantity discount sheet which we may hereafter issue. The guarantee is made to rebate customers only. The guarantee applies only to goods named on our Hardware and shoe finders' price lists. The guarantee does not apply to goods on said lists sold for export. **Guarantee.**—In case we reduce our published prices of any goods on the above lists at any time after December 1, 1884, we will allow to our customers who may be entitled to rebate as above, the following abatements on invoices of such goods (except those sold for export) shipped by us to them on or after December 1, 1884, viz.: On invoices shipped during the first month next preceding such reduction, the whole of the net reduction of price; or invoices shipped during the second month next preceding such reduction, one-half of the net reduction of price. No abatement will be made under this guarantee on any invoice shipped more than two months prior to such reduction, nor on any invoice shipped prior to December 1, 1884. No customer will be entitled to abatement under this guarantee who purchases, or has in his possession, any goods on the above lists manufactured by parties not associated with us. The above guarantee is subject to withdrawal at any time; but no rebate customer shall thereby lose the benefits of the guarantee as regards invoices shipped prior to notice of such withdrawal.

December 1, 1884.

MALLORY, WHEELER & CO.,

New Haven, Conn., who are widely known as manufacturers of Locks, are prosecuting their business energetically and reaching out in other directions. At their New York store, 55 Chambers street, where they are represented, as our readers know, by Frederick G. Brower, they will hereafter carry a full stock of their goods for the purpose of supplying their customers promptly, especially for export and city trade. They are also intending to increase the line of their manufacture, and have already new patterns of Store Door Handles and Locks, and expect to come into the market at an early day with a line of fine and cheap Butts, Flush Bolts and other House Hardware.

PLANES.

In addition to the changes in prices to which we have already directed the attention of the trade, the manufacturers in the Plane Association are contemplating some changes in the method of marketing their goods, which will go into effect on the 1st of January next. It has been decided, we are informed, with the possibility of some change previous to that date, to discontinue all agencies after January 1, the manufacturers also being prohibited from traveling for the sale of their goods, orders for which are to be sent to the several factories. The latter point, however, we do not understand to have been finally determined upon. All goods to be delivered at their respective places of manufacture. It is intimated, also, that an arrangement will be made by which a rebate will be given to jobbing houses who do not sell Planes at better than the manufacturers' printed prices for the retail trade. The object of this movement is to secure uniformity in the prices of goods, to afford jobbers who do not break the prices a good profit, and to enable the manufacturers to conduct their business at less expense than heretofore. With the accession to the association of the two houses that have heretofore been outside, the combination is regarded as in a strong and satisfactory condition.

WIRE CARPET NAILS.

With reference to the inquiry which was made in our last issue as to the qualities of Wire Carpet Nails, or Tacks, as they are called by some parties, we have received the following communication from a responsible house in Michigan:

To the Editor of the Iron Age: As regards Wire Tacks, we bought our first lot less than two months ago, and already find they are called for in preference to Cut Tacks. We use the Russell & Erwin Manufacturing Company's Tinned and Blue Steel Wire Tacks, and we are satisfied that not a single customer of ours would take Cut Tacks if both were placed before him at the same price, which is an index of the way they sell. While a large part of the Tacks used are, of course, for fastening down carpets, the number of calls for them in every household is unlimited, and in most instances the Tack that will clinch is by far the best. We think that Steel and Iron Wire Tacks are bound to drive Cut Tacks out of the market if the price is the same. One of our customers mentions an advantage, which is that they drive straighter, or are not so liable to cant over when being driven as the Cut Tack is, which he thinks is on account of the greater uniformity in the taper of the points of the Wire Tacks. Any one can readily see the disadvantage of a Tack that cants over toward the base board while being driven within 1/4 inch of it.

On page 32 will be found the advertisement of Samuel Martin, 127 Eighth avenue, in this city, who is ready to supply to the trade such

THEATRICAL HARDWARE

as they may require. In this line of business Mr. Martin holds a prominent place in this city, and is regarded as an expert, to

whom our readers who are in want of Hardware for the operation of scenery on the stage, &c., may send their inquiries. It will be a convenience for those who are called upon to supply such goods, which are not widely known, to have the address of Mr. Martin.

AUGERS AND BITS.

The Associated Manufacturers of Augers and Bits held a meeting in this city to-day, at which it was decided to continue the present discount of 60 per cent. as the price on these goods. At this meeting we are assured that the manufacturers took measures which, it is intimated, will result in securing the maintenance of this price more rigidly than heretofore. This is claimed to be a figure that affords but a narrow margin to the manufacturers, who inform us that they are unable to produce the goods with anything of a satisfactory profit at any material concession from present prices.

MISCELLANEOUS PRICES.

From a reliable correspondent in the West we are advised that the travelers who are on the road are urging the purchase of goods in a disheartened sort of way, all quoting about the same low prices as inducements. These prices in many cases are below the regular figures at which the retail trade are presumed to be sold, there being in most lines of goods considerable weakness, and manufacturers and jobbers who are on the road being anxious to book orders.

The Screw market continues to be weak; the tendency being decidedly to lower prices, but very few orders of any amount are being given. The general impression is that early next year there will be a decline in Tacks. Some Western houses who are supposed to have a stock of Handled Planters' Hoes purchased at old figures are offering them at concessions from the prices adopted by the Steel Goods Association.

Manila Rope is reported weak on account principally of the decline in the price of Hemp.

With reference to the

INQUIRY

which appeared in last issue, with respect to the best method of drawing oil—an article which is handled by Hardware men in some parts of the country—we have received several replies. Among these is the following facetious answer from a Michigan house:

To the Editor of the Iron Age: In reply to the Hardware man's inquiry in *The Iron Age* of November 27, we would suggest to the merchant that has to draw oil in a dark cellar, either to put more windows in or let some one else draw the oil. That is the way we do it in the U. P. of Michigan.

SUBSCRIBER NO. 2.

But we have also heard from parties in the trade who prefer a mechanical contrivance to the method suggested above. One of our correspondents mentions that Emery & Co., Pittsburgh, Pa., have an Oil Pump which can be used with a barrel either on the store floor or in the basement, an article that certainly appears to have points of utility and convenience. W. J. Clark & Co., Salem, Ohio, are also in the market as manufacturers of Marchand's Patent Self-Measuring Oil Pump, which is rotary in its action, and in the use of which the supply tank or barrel may be located, if desired, in the basement, while the oil is drawn on the floor above. This article, in addition to the convenience resulting from having the barrel out of the way, is, as indicated in the name, self-measuring, eight complete revolutions filling 1/2-gallon measure, and is said to be capable of adjustment to accurate measurement by a simple mechanical contrivance.

NEW GOODS.

Maltby, Curtis & Co., 20 Warren street, New York, are putting on the market a new Pocket Oiler. This Oiler, which is made of figured brass and nickel-plated, is decorated with vine pattern ornamentation, and is intended especially for skaters, bicycle riders, sportsmen and machinists, besides being a useful article for household use. The same Oiler is also made of their new gold metal in similar style of ornamentation. The same parties are also introducing new Cigarette Cases, hammered gold pattern, which are made also of their new gold metal, which, they say, will not tarnish. These Cases will hold a full package of cigarettes, are packed one dozen in a box, one gross in a case. Steel Spoons, Linden pattern, Teas and Tables, and Steel Forks, Nickel and Silver-Plated, are being offered by the same house, and at figures that are claimed to be exceptionally low for the style of goods.

The Buffalo Hammer Company, Buffalo, N. Y., who are, as noticed in our last issue, successors to Henry W. Kip in the manufacture of Solid Cast-Steel Hammers, Sledges, &c., are intending to add three or four new Hammers to their list which will appear in February or March. They have increased their facilities for manufacturing by the addition of new machinery and the thorough overhauling of the old, and advise us that they are prepared to manufacture Solid Forged Steel Hammers of the best quality and make a specialty of Drop Forgings.

The Diamond Wrench Manufacturing Company, Portland, Me., are about putting on the market their Improved Steel Wrenches, a tool which they have been carefully perfecting, and of which we hope in our next issue to give a description.

The supplement to the catalogue and price list of the Columbian Iron Works, John D. Johnson, 139 and 141 North Seventh street, Philadelphia, Pa., presents to the trade a

line of Washstands, Basins, &c., which he has recently added to his assortment, and on which he is prepared to make the lowest market rates. It exhibits different patterns of Half-Circle Washstands, Corner Washstands and Double Washstands on standards, as well as other styles without standards. These goods are furnished plain, painted, galvanized, or enameled, bronzed, as desired.

ITEMS.

The Champion Roller Skate and Wagon Company, Richmond, Ind., are advertising Rowlett's Star Roller Skate in exceedingly tasty engraved cards of considerable artistic merit. For this Skate the manufacturers claim lightness, perfect adjustability, superiority of mechanism, ease of running and durability, and mention that it can be turned in a 23-inch circle with all the wheels on the floor.

The Union Hardware Company, Union, Broome County, N. Y., have issued their second illustrated price list, under date November 1, in which they show the line of Carriage Hardware which they are making. The name of this company was recently changed from the Union Coach and Carriage Company to the Union Hardware Company, as given above. In addition to the goods which are illustrated in their catalogue, Clips, Bolts, Step Pads, Plates, &c., they are, we understand, in a position to furnish special Forgings to order.

Dame, Stoddard & Kendall, 374 Washington street, Boston, issue a price list of Skate Bags and Boxes intended for the different styles of Roller and Ice Skates.

J. Stevens & Co., Chicopee Falls, Mass., have issued for 1884-1885 a price list of their line of Fine Mechanics' Tools, consisting of Calipers, Dividers, Surface Gauges, Countersinks, &c. In their introductory remarks they mention that within a few years foreign goods of this description have taken the lead in the American market, but that they are now offering to the trade Calipers and Dividers equal to the imported for correctness and quality of work and nicety of finish. In addition to the common styles, they are introducing new patterns which they speak of as approved by those mechanics who have used them, such as their Key Hole and Screw Calipers, Dividers with Thumb Attachment, used by draftsman for measuring distances. They also call attention to their new Patent Helical Calipers and Dividers. They have recently been enlarging their works and expect to be able to produce their goods so as to fill foreign and domestic orders promptly. They also say that they can ship their goods with those of the Millers Falls Company, Bemis & Call Hardware Company and other Eastern houses, thereby saving freight charges.

The advertisement on page 32, in which the Eastern Club Skate is offered to the trade, will attract the attention of our readers. It is suggested that parties ordering these goods send their orders to the houses nearest to them, the list of the agents being given in the advertisement. It will be perceived that Loudonback, Gilbert & Co. handle these goods in this city.

Bigelow & Dowse, Boston, who are offering Imitation Acme Skates, call attention to a decision of the United States Court, October, 1875, to the effect that "the words imprinted upon a patented article of manufacture are common property from the date of the expiration of patent," as justifying them in the sale of Skates bearing this name.

From a Western Hardware man we have received the following communication on the subject of

CREDIT TO FARMERS.

in regard to which our correspondent's experience, we imagine, not materially differs from that of other retailers.

To the Editor of the Iron Age: There is a subject which is agitating the retail trade in many sections of the country which may not have come to your notice. It is the giving of credit to farmers and then having them abuse it. Farmers, as a general rule, are not business men in the usual acceptance of the term. Should the same class of men enter other lines of business they would make grand failures. The Hardware trade especially, that combine the sale of Agricultural Implements with their other business, find the giving of credit to farmers very tedious and troublesome. I will cite one instance that has come to my notice: A merchant had been carrying a farmer for a year after his note was due. The farmer told the merchant he would have to carry him for another year, because he had purchased more land and paid cash for it, and so could not meet this previous obligation. Some farmers think as much of their word and paper as any merchant does, but they are in the minority. A farmer will want credit on a book account until "after harvest." The merchant may look for his pay anywhere between August and January. They do not mean to be dishonest, but it is shiftlessness or disregard of promptness. If the farmer says he will be in town in a week to get some article of merchandise he has selected, it may be two or three weeks before you see him. It may seem strange to an Eastern business man, but a farmer will fight as shy of giving a bankable note as he would of a mine loaded with giant powder. They will give a note payable at your place of business, with "bale" or "surety," the "bale" writing his name under the signer's name on the face of the note; but he will refuse in almost every case to give a note, payable at the bank, with an indorser, that can be protested. The farmer is the first to object to dull or hard times, though he gets cash for everything he brings to market. When the market price of farm products does not come up to his expectation, he holds them for better prices, though he is owing accounts or is paying interest on

borrowed money. Collections among farmers this fall are very slow, notwithstanding the largeness of crops of all kinds. Indeed, one of the present drawbacks to business is the slowness with which the farmer can be made to realize that wheat is not too low in proportion to other merchandise. They still think they should get \$1 and \$1.25, when the market price is much less. In looking forward to the business of another year it becomes a serious question, the matter of giving credit to farmers. At least it is so in this section, but perhaps our experience is different from that of your other subscribers.

SIG.

TUBULAR LANTERN PATENTS.

Upon final hearing in the case for infringement of the Tubular-Lantern patents brought by the Steam Gauge and Lantern Company, Rochester, N. Y., and John H. Irwin, inventor, against Edward Miller & Co., of Meriden, Conn., a decision was rendered in September by Judge Shipman, of the United States Circuit Court, declaring the Miller & Co. Lantern an infringement of the several patents in question, and ordering an injunction against their further manufacture and sale. The effect of this decision is stated by the Steam Gauge and Lantern Company to be that any Lamp or Lantern the flame of which is supplied with air through tubes is an infringement of their patents, and they accordingly make the claim that no one excepting their company and R. E. Dietz, of this city, is authorized to manufacture Tubular Lamps and Lanterns. But another view of the effect of this decision and of the whole litigation concerning Tubular-Lantern patents is given in the following statement, which we have from one of the manufacturers against whom action has been taken as infringers by the plaintiffs in the above suit:

As we understand the situation, the bottom claims of the patent on Tubular Lanterns were upset by Judge Shipman's decision in the suit of the Steam Gauge and Lantern Company against Edward Miller & Co. At all events, Judge Shipman refused to give judgment against the defendants on that patent. So far as concerns the claim of the Steam Gauge and Lantern Company, that this decision gives them the control of all Tubular Lanterns that supply air from tubes, it has no foundation in fact. There are two minor Lantern patents that the Steam Gauge and Lantern Company have never (at least, to any extent, if at all) put in the market. These two patents were sustained by Judge Shipman, but the Judge did not have the evidence before him that we propose to produce before the case comes up for final trial. We fully believe that, had this evidence been properly presented, Judge Shipman's decision would not have sustained either of these patents. The restraining order was upon these two patents, and not on the bottom patent. The position of the matter at present is that we have a motion pending to dismiss the bill, which motion has not yet been reached for hearing. We believe that we have a perfectly sound defense to the demands of the Steam Gauge and Lantern Company, and are so advised by our counsel, and we purpose to see this thing through, in which effort we shall be pleased to receive the co-operation of all parties in the trade who may be assailed by the Steam Gauge and Lantern Company.

There being thus a wide difference of opinion as to the effect of the decision rendered and the final outcome of the litigation with reference to these important patents, and as a matter of general interest to the trade, we print below the full text of Judge Shipman's decision, that our readers may be enabled to form an intelligent judgment of its precise scope and effect. But to aid them in doing this a brief review of the course of the litigation, giving the principal facts relating to it, will be of service, and we accordingly give our readers the following outline of the history of the case, for the greater part of which we are indebted to the successful parties:

The leading Tubular Lamp and Lantern patents were granted to John H. Irwin, now of Morton, Pa., and under them the well-known and standard Tubular Hand Lantern has been manufactured. Several of these patents had been sustained in several suits prior to 1879, when the Buffalo Steam Gauge and Lantern Company, of Rochester, N. Y., sought to avoid the Irwin patents and the decisions of the courts in suits upon those patents by its No. 99 Lantern. This No. 99 Lantern was, it is claimed, the first Lantern put upon the market which was so constructed that its tubes received, for the support of combustion, air wholly outside of that which ascended in the globe. Immediately upon the manufacture of this Lantern by the Buffalo Steam Gauge and Lantern Company suit was commenced against that company by Mr. Irwin and his co-owners of his patents, and they also at the same time commenced suit at Chicago against M. McRoberts, the agent there of the Buffalo Steam Gauge and Lantern Company. In this last-mentioned suit a motion was made by the complainants for a preliminary injunction, and the same was argued in the United States Circuit Court, at Chicago, before Judge Blodgett, in July, 1879. The court held that this Lantern differed so materially from those which had before been held to infringe the Irwin patents that those decisions could not be invoked against this Lantern, especially so since the alleged infringement was of new claims of the patents as reissued and of a later patent to Irwin, which had not been sued upon before. He, however, required the defendants to furnish adequate security to the complainants as a condition upon which the motion for injunction was denied.

This suit thereupon proceeded to final hearing, but before the hearing the defendants became satisfied that they could not successfully defend the suit, and thereupon they negotiated a purchase and control of all the interests under all of the Irwin patents. This done, the Steam Gauge and Lantern Company were organized, which company bought all of the assets of the Buffalo Steam Gauge and Lantern Company and completed the purchase of the Irwin patents, and, with Irwin, became, and still are, the owners of all of his Lamp and Lantern patents. At about this time E. Miller & Co. began manufacturing a Tubular Lantern, as also did F. Meyrose & Co., of St. Louis.

Immediately after the organization of the Steam Gauge and Lantern Company, it commenced suit in the United States Circuit Court, at Hartford, Conn., against E. Miller & Co. In this suit a preliminary injunction was granted against E. Miller & Co. in 1881, but was afterward vacated in consequence of new doctrine declared by the United States Supreme Court. Thereafter the suit progressed with the delay incident to an important and strenuously-contested litigation, and a decision was not reached until September, 1884, when the decision referred to above, and printed below, was made in favor of the plaintiffs. Immediately afterward an injunction was issued and served upon defendants, permanently restraining them from manufacturing or selling such lanterns. It is intimated that the complainants will proceed to assess their damages for the infringement.

Before the Steam Gauge and Lantern Company had acquired these patents, suit was commenced by Mr. Irwin and his co-owners against F. Meyrose & Co., of St. Louis. In this suit, it is stated that Mr. Irwin's attorney neglected to appear in court when the case was called, and Mr. Meyrose's attorney accordingly took a decree dismissing the suit. Afterward the court refused to vacate this decree. About the same time Mr. Irwin and his co-owners of these patents commenced a suit against the manufacturers of the Buckeye Lantern, but the litigation against Meyrose & Co. and against the Buckeye people has been allowed to rest by the Steam Gauge and Lantern Company, awaiting a decision in the Miller suit.

Since this decision we learn that the Steam Gauge and Lantern Company and Mr. Irwin, who jointly own these patents, have commenced suits for infringement against other manufacturers, against whom, we understand, injunctions have been obtained. It is expected that the pending suits will settle the question as to all the lanterns of this kind in the country.

The following is the decision referred to above:

SHIPMAN, J.—This is a bill in equity founded upon the alleged infringement of letters patent to A. R. Cribfield, dated April 2, 1867, and of the four following letters patent to John H. Irwin, viz.: Reissue No. 8611, dated March 4, 1879, of original patent No. 73,012; Reissue No. 8598, dated February 25, 1879, of original patent No. 89,770, dated May 4, 1869; No. 104,318, dated June 14, 1870, and No. 151,703, dated June 9, 1874.

The plaintiffs do not ask for a decree except upon Claims 1, 2, 3, 4, 5 and 8 of Reissue 8598, Claim 1 of No. 104,318, and Claim 2 of No. 151,703. The first two patents are for improvements in lanterns which burn kerosene, and the third is for an improvement in the same class of lamps or lanterns.

The view of the court upon the propriety of granting the plaintiff's motion for an injunction, *pendente lite*, against an infringement of these patents a description of Reissue 8598, and of the invention which it claimed, were given in *Steam Gauge and Lantern Company vs. Miller & Co.* 8 Fed. Rep., 314, and same *vs. same*, 11 Fed. Rep., 718. The history of the inventions of Mr. Irwin preceding and including No. 89,770, and the views of Judges Drummond and Blodgett upon that patent and two prior patents, are contained in *Irwin vs. Dane*, 9 O. G., 642.

The lantern which was made under No. 89,770 and under Reissue 8598, was the first successful kerosene hand-lantern which was ever made. It has gone into universal use wherever kerosene is employed for illuminating purposes, and has superseded all previous devices.

A characteristic novel principle of this lantern, and the one which, in combination with the other parts of the device, gave it its success, was the supply of fresh or external air to the flame by means of deflectors, which compelled the introduction into the supply tubes, in an irreversible current of air, which, but for such deflectors, would blow over and exhaust the tubes. Previous structures had supply tubes which returned vitiated air to the burner, or which furnished fresh air from protected chambers, or which furnished whatever fresh air would enter through an open funnel or bell mouth, but no previous structure furnished fresh air by the aid of injectors which compelled air which would otherwise strike the lantern in such a direction as to exhaust the tubes to enter the tubes in a continuous and irreversible current. Mr. Quimby, the plaintiff's expert, correctly states this principle in this way: "The new thing consists in providing the place where the outside air enters with deflecting plates, which will insure the entrance into that place of currents of air, which, but for the presence of the deflecting plates, would tend to draw air out of that place." The defendant's counsel, not admitting the value of this peculiarity of the "tubular" lantern, have proceeded, upon their part of the case, upon the theory that the device was but a modification of pre-existing devices which had supply tubes, and was not a primary invention.

While this compulsory introduction of external air into the supply tubes was an important and novel feature of the invention,

and the one which gave the lantern its distinctive character, the inventor retained in his structure the tube H, the common mouthpiece of the supply tubes, and which, as in his older lanterns, furnished or could furnish as opportunity offered, a supply of air heated by the burner flame. This lantern was thus both an internal and external air feeder. The defendants' lanterns are external air feeders, having elevated tubes outside the globe, disconnected with each other, and for the admission of fresh air only, and having injectors at the mouths of the tubes, which will be hereafter described.

When the lantern of Reissue 8598 is at rest and is not blown upon by the wind, the heated air constitutes the only source of supply. When the lantern is oscillated in a violent wind, the plaintiffs insist that the heated air is necessarily expelled through the ejector, and the fresh air becomes the only source of supply for the flame.

The first question to be decided is as to the construction of the reissued patent, assuming that the lantern, when used out of doors in the ordinary way in which swinging hand-lanterns are used, is an external air feeder. The claims of the original and reissued patents are substantially recited in 8 Fed. Rep., 314. The first, second and eighth claims of the reissue are new. The third, fourth and fifth claims are the same as the first, second and fourth claims of the original.

The important new claims of the reissue are the first and second. The fourth claim of the reissue, which was the second claim of the original, is the same as the first claim of the reissue, and the fifth claim, which was Claim 4 of the original, is the same as the second claim of the reissue, with the exception that each of said old claims has for one of its elements expressly stated the tube H. In the new claims this tube and the supply tubes F F are called conduits which supply fresh air to the burner. The plaintiffs contend that the tubes H and F supply fresh air, and, as occasion requires, nothing but fresh air to the flame, and, therefore, that the original was not enlarged by specifying that such was their office. On the other hand, if the intention of the patentee, when the original specification was drawn, was to describe and claim a lantern which was supplied by external air aided in anywise by an ascensive current or blast of heated air, or which was supplied either from one or the other source alone, as circumstances required, and if the description and claims specified as the thing invented and patented a lantern which had this double source of supply, then the first two claims of the reissue, which was issued 10 years after the date of the original patent, are to be construed in accordance with the original claims, or are to be held to be an undue enlargement of the original patent. The eighth claim specified conduits which receive the "entire supply of fresh air for the interior of the burner."

Although the inventor said in the specification of the original patent that the deflection of the external air "would produce a current through the tubes F F in the absence of any other cause," I think that he meant to describe and claim a structure having conduits which would supply heated air when the lantern was at rest, and external air when the lantern was exposed to the wind, and would also have in the last-named condition the advantage, if any there might be, of a current of heated air. He meant that his patented lantern should be a structure having the cumulative advantages of internal and external air feeding, and that his patent should be for a lantern which had heated air as an assistance in introducing a flow of fresh air through the tubes. This is shown in the following paragraph in his specification: "It will also appear from the above description that there are three separate causes to produce a proper current through the tubes F F to the base of the flame, viz.: the ascensive force of the air heated by the burner flame and the cooling of said heated air within the tubes, the presence of a moving current deflected toward the mouth of the tube H, and the centrifugal effect of swinging or oscillating the lantern. And it will be observed that either the second or third causes will always be cumulative with the first to produce an increased current at exactly the time when an increased supply is demanded in consequence of atmospheric disturbances in the immediate vicinity of the lantern."

It follows that the defendants' lanterns do not infringe Reissue No. 8598.

It is unquestionable that the lantern described and claimed in Patent No. 104,318 is an external air feeder only. The lantern is very similar in external appearance to that of Reissue 8598. The feeding tubes open at their lower ends into an air chamber above the oil pot. At their upper ends these tubes open into the "air chamber F," which is open at bottom and closed at top and surrounds the upper end of the chimney. This "air chamber" is an enlarged mouthpiece of the supply tubes, and is closed at the top, so that it shall not receive any of the heated air which passes through the chimney. The chimney is surmounted by a deflecting cap and surrounded by a deflecting plate, which are separated from each other by an annular space. At the bottom of the chamber F are two annular deflecting plates, corresponding in diameter and relative disposition with the plates at the top of the chimney.

The first claim of the patent is for "the annular chamber or fresh-air inlets F, arranged with a deflecting plate or plates or their equivalents in the manner substantially as shown and described."

The construction of the air tubes of the defendants' lanterns is correctly described by Mr. Quimby, as follows: "The upper ends of the elevated air tubes are each provided with injecting devices or deflecting plates. * * * In one of the lanterns a single vertical plate extends upward from the center of the upper open end of each tube. In the other lantern there is at the top of each tube, in addition to this vertical plate, another deflecting plate which consists of a strip of metal inserted into the upper end of the tube and occupying a plane perpendicular to the first-mentioned deflecting plate."

This strip of metal is curved outwardly to the upper outer corner of the first-mentioned

deflecting plate, and is turned horizontally inward along the upper edge of the first-mentioned deflecting plate, soldered to the tin cylinder which forms a portion of the top of the lantern. A horizontal plate extends around the top of the lantern, and occupies a plane midway between the upper edge of the first-mentioned deflecting plates and the upper ends of the tubes, this horizontal plate being slotted immediately over the tubes, so that air striking against it is turned toward the vertical deflecting plates, and by them is turned downward into the mouths of the tubes. The metallic cylinder which forms a continuation of the top of the globe is provided with an ejector, which consists of a circular plate supported at some distance above the top of the upper end of the cylinder, and which is of larger diameter than the cylinder.

A current of air blowing laterally against either lantern enters the space between the upper end of the cylinder and the circular plate, and draws air out of the interior of the globe, and ejects it from under the lee edge of the circular plate. At the same time such current of air is turned by the deflecting plates into the upper ends of the air tubes, and, being there injected, flows down those tubes into the interior of the cone."

The question in regard to the infringement of No. 104,318 turns upon its construction. The defendant insists that the patent is limited, in its first claim, to a structure having an annular chamber which receives cold air and transmits it to the tubes, and that this receptacle must be literally a chamber.

The words "fresh-air inlets" show that the office of the chamber is to admit fresh air; the receptacle of cold air which the patent calls a "chamber," is simply the common mouthpiece of the two supply tubes, and whereas in the patent of 1869 this common mouthpiece, which was there called a tube, received both heated and cold air, it now cannot receive heated air, and receives and transmits cold air only. It is annular, because, being the mouthpiece of two annular tubes and encircling the chimney, it is naturally annular also. If this annular common mouthpiece is cut off, and air is admitted through two separate or independent mouthpieces of two tubes, then there will be two annular chambers. The somewhat fanciful term "annular chamber" does not elevate the thing of which it speaks into anything else than the mouthpiece of two tubes. The two open ends or mouths of the defendants' tubes operate on the same principle and perform the same function by analogous means (McCormick vs. Talcott, 20 How., 402) as the one chamber or common mouth of the tubes of the patented lantern. The defendants' deflectors are another and an equivalent form of the deflectors of the patent.

The improvement in Patent No. 151,703 was mainly intended for a house lamp, and was another application of the principle contained in No. 104,318, of supplying a kerosene lamp or lantern with cold air only, by means of deflectors, which shall direct the air into the tubes in an irreversible current. The patent shows how the improvement can be applied to lanterns.

In this patent one or two supply tubes are used. The common mouthpiece is dispensed with, and the deflectors are placed over the open mouth of each tube. The patentee says that his invention consists, first, "in combining with a lamp burner or wick tube a surrounding air chamber and a draft tube, extending therefrom to a point detached from the outlet of the chimney top, and nearly or quite as high above the flame as the outlet for the products of combustion; and, second, in combining with said draft tube an atmospheric injector, to cause the air currents, in whatever direction moving, to enter said air tube and descend to the flame."

The injector was composed of a number of conical shells arranged with their bases outward and concentric with the axis of the tube. "Their effect," says the patent, "is to deflect into the tube E the atmospheric currents which come in contact with said plates, from whatever direction, and thus insure a current of air through said tube uniformly in one direction."

The second claim is as follows: "In combination with the burner, having the wick tube surrounded by an air chamber, and provided with one or more independent draft tubes E, the atmospheric injectors F at the open ends of said tubes, as set forth."

The main defense against the charge of infringement is that the defendants' injectors do not receive air from whatever direction it may come, but only from some particular directions. This is a secondary patent, being an improvement upon the lantern of No. 104,318, which furnished nothing but unheated, external air to the flame, the improvement consisting in placing injectors or protectors at the upper ends of one or two tubes. I do not, therefore, give the patent the defendants' narrow construction which is that it is limited to the particular form of protectors or injectors which are described. The defendant's protectors are one of a variety of equivalent forms which could be adopted without departing from the principle of the invention or the claim of the patent.

Let there be a decree for an injunction against an infringement of the first claim of No. 104,318, and the second claim of No. 151,703, and for an accounting, and for a dismissal of so much of the bill as relates to the Cribfield patent, and to Reissues Nos. 8611 and 8598.

PLOWS AND CULTIVATORS.

We are advised that a meeting of the Northwestern Plow and Cultivator Association was held at the Tremont House, Chicago, on the 2d inst., to complete the reorganization which was begun in September last. After the by-laws and constitution, which were presented by the committee appointed for that purpose, were adopted, the association formed a permanent organization by electing Col. H. T. Noble, of Dixon, president; A. C. Bryant, of Moline, secretary, and J. R. Haine, of Monmouth, treasurer. The association numbers about 35 of the most prominent manufacturing firms in the West and Northwest, and has

been organized for the better protection of the interest of the business they represent. General expressions from all the manufacturers were had regarding the outlook for further trade. The marked depression of business which is prevalent, and the great amount of stock which is now in the hands of manufacturers, led to the passing of a resolution that a curtailment of 25 per cent. on the product of 1884 should be carried into effect on goods produced in 1885. On prices they decided to make no change, unanimously agreeing that present rates were as low as implements could be made at the present cost of material. The time for payment on Plows has been July 1, and on Cultivators October 1, and it was agreed to continue these dates during the coming season. When the association convened it was intended that action should be taken on several other important topics, but after a full discussion of the condition of affairs it was decided to defer such action until a revival of business should occur. The meeting adjourned to meet one year hence, or sooner, if necessary, at the call of the president, the manufacturers expressing satisfaction with the decisions reached, and looking forward to an improved condition of trade in this line.

Coal.

The Anthracite Coal market is not as satisfactory as one week ago, the demand being less active. In regard to the future, the only action taken by the companies is an agreement for the suspension of mining from December 22 to the 27th, covering the usual Christmas holiday. The coming week, therefore, will practically end the Anthracite Coal trade season of 1884, as the remaining days will be devoted to "cleaning up." The general range of prices remains about as last reported, viz: Fair Stove, f.o.b., \$4.15 @ \$4.20. Lehigh Stove, \$4.40; Chestnut, \$3.75 for Fair, and Best Lehigh, \$4 @ \$4.10. Fair Broken, \$3.65, and Broken Lehigh, \$4 @ \$4.10, all f.o.b. The Pottsville Miners' Journal of December 5 says: "All the collieries except those operated by the Philadelphia Coal and Iron Company, which are now being run on three quarters time, are being pushed to their fullest capacity, in order to get as much Coal as possible forward before the close of operations of this year, which will probably be on the 15th of this month."

Nothing has been decided with reference to the plan of operations for the coming year, but the opinion is frequently expressed that the allotment system will probably be adopted.

The total amount of Anthracite Coal sent to market for the week ending November 29, as reported by the several carrying companies, was 858,734 tons, compared with 719,807 tons in the corresponding week last year. The total amount of Bituminous sent to the Eastern markets thus far in the year 1884 is 5,096,759 tons, compared with 4,626,000 tons for the corresponding period last year, an increase of 470,759 tons.

Metal Exchange.

We are reported the following transactions as having occurred on the floor of the Exchange since those noted in our last issue:

MONDAY, December 8.	
10 tons Tin, March.....	\$0.163
TUESDAY, December 9.	
10 tons Tin, Feb.....	.162
10 " " ".....	.1615
10 " " ".....	.1615
30 " " March.....	.1615

English Letter.

(From Our Regular Correspondent.)
LONDON, November 24, 1884.

THE WEEK

has again passed over rather quietly, the only notable event being the signal defeat of the fair-trade candidate in the Borough of Hackney, to which election I made some reference in my last letter. When I say the defeat of the Fair-Trade candidate, I am, perhaps, not quite accurate, because the platform adopted by the conservative Candidate included many planks on which issue was taken besides the fair-trade one. It is quite correct to state, nevertheless, that he did "go for" fair trade, and that the Liberal candidate stuck to free trade in the most unequivocal manner. In the result the Liberal won by about 6000 votes out of a total of, say, 21,000 voters. This was a small poll, there being over 48,000 voters in the borough, so that not 50 per cent. went to the poll, leaving the general impression that they were quite indifferent as to the result of the election. No great surprise is felt at the result, because Hackney has always adhered to the Liberal cause, and has sent its members in by thumping majorities—generally much heavier than on this occasion. The Conservatives say they have reduced the majority this time to a marked extent, and they allege that they are not dissatisfied with their figures, under all the circumstances of the case. It has to be noted, however, that their candidate polled 2000 votes fewer than did the Conservative at the last election, but on that occasion the Liberals also secured a far heavier vote. Briefly, it may be safely inferred that fair-trade principles have not yet taken a deep hold upon the people of London, notwithstanding the great complaints which are constantly heard in the industrial parts of the metropolis as to the ruinous effects of German, &c., competition in the various trades which are (or rather were) largely carried on hereabouts. The continued dryness of the weather is again causing a good deal of uneasiness to the water companies as well as to riparian authorities and the

agricultural community in general. The rainfall has been deficient ever since about last November, some of the months which are ordinarily most favored by Jupiter Pluvius having been exceptionally free from rain. That was the case in the spring, and it has also occurred this autumn. The summer, as you are well aware, was exceedingly hot and droughty, so that, on the whole, we have had a remarkable shortage of rainfall for about a year, after so many years of excessively wet seasons. For the land in some parts of the country this dryness is good and very beneficial, but on the lighter soils rain is badly wanted. The rural communities and small towns are suffering from a great scarcity of the precious fluid for drinking purposes, and in some places they have to fetch it for miles for watering their live stock. Even some of the larger cities and towns, such as Manchester and Bradford, for instance, are running short despite their magnificent systems of storage reservoirs and their control of the great watersheds which are divided by the Peak and Pennine ranges of hills. At Manchester there are said to be only 50 days' supply in stock, and it is notified that the city is to have the water turned on for 12 hours a day only until the stores are replenished. Conferences are to take place with the various manufacturers who are large consumers, and no doubt contrivances will have to be effected for keeping them going, or compensation given in default. At this time of the year this threatened water famine is very noteworthy. Were it at midsummer, nobody would be at all surprised. Should the rainfall continue insufficient, serious results would doubtless ensue, especially in places where steam-power is largely employed. In London we have as yet had no reason whatever to complain, and up to the present nothing is said as to any probable shortcomings here.

THE IRON MARKET

remains in a quiet condition all round, and the doings of the week are scarcely worthy of special mention in any branch of the trade. The shipping season for the Northern European and Canadian ports being now virtually at an end, there will be a necessary diminution of the exports of pig iron, &c., and we are pretty certain to experience the usual period of quietude which comes toward the end of the year. That being so, and bearing in mind the incidence of other causes producing like results, any change in values in an upward direction may be regarded as extremely unlikely. Practically, we have now only a month left of 1884, after which will come the holidays, so that no alteration of moment is probable prior to the end of January, even if anything of the kind should happen then. It is possible, of course, that your market may make a move early in the new year, but even in that case we are scarcely likely to feel any beneficial effects during the first quarter of next year. Meantime there may be a gradual firming up of values, until toward April or May a substantial improvement may take effect. All this, however, is largely conjectural, and we shall probably do well to take the best of our position, while not neglecting contingencies of all kinds. At Glasgow the market has assumed a quieter tone, as a consequence of the disappearance of certain prominent "bear" operators, but values have not receded to their own level—warrants having been about 43/8, closing at 43/8 1/2 ton. In Scotch makers' brands of pig iron only a small business is reported, but, with one or two exceptions, recent prices are steadily maintained. Shipments for the year to date show a large decrease, which fact operates as an effective set-off to the reduced stocks held by Connal & Co. The imports of Middlesbrough pig iron are still very quiet, and values are somewhat irregular, on the basis of 36/6 @ 37/ for No. 3—merchants offering the lower rate, and makers holding out for full prices. The shipments are now indifferent, and may be expected to show a reasonable decrease during the next few months.

In hematite pig irons the steadiness of the past few weeks appears to have become more pronounced, many of the smelters being reported well booked. Some of them decline to quote at all, but the current rate for mixed lots of Nos. 1, 2 and 3, in usual proportions, may be taken to be 44/6 @ 45/ for early deliveries, and about 1/ 1/2 ton more for forwards. Speigleisen is nominal at about 77/6 @ 80/ 1/2 ton, but is steadier, on the whole, as compared with a month ago. Elsewhere crude irons are moderately steady, but there are no appreciable alterations in late rates. Deliveries continue fair, and there are said to be several inquiries already as to supplies over the first quarter of 1885, for which some of the smelters are inclined to ask rather more money. In heavy manufactured iron I have nothing new to report, the majority of the works being poorly off for work, and pretty certain to remain so for some time ahead. Fencing wire and galvanized iron are as last reported, with a tolerable turnover in the latter on export account.

SCOTCH PIG IRON

is quieter under the circumstances already mentioned. There are now 95 furnaces in blast in Scotland, as against 101 a year ago, and warrants stand at 43/8, compared with 44/2 last year. In Connal's Glasgow stores there are 579,825 tons (last week's decrease being 61 tons only), as against 585,710 tons this date, 1883. To date the total shipments are 92,517 tons in arrears on an aggregate of 485,953 tons, while Middlesbrough pig iron imports into Scotland are 5855 tons behind on a total of 235,509 tons to date this year.

Profits of the Anthracite Coal Carriers.

The carriers of coal, says the Philadelphia Record, make an average profit of 21 per cent. upon the cost of their road and equipment. The figures showing this come from the reports of the coal companies. They are as follows:

	Cost of road and equipment.	Net earnings, to cost.	Per cent. of net earnings.
Del. & Hudson...	\$6,957,188	\$888,550	12 1/2
Del., Lack. & W....	33,089,386	2,940,320	8 1/2
Lehigh Valley....	23,268,041	2,042,494	10 1/2
Pennsylvania....	61,771,025	18,096,490	22 1/2
Phila. & Reading...	42,487,722	18,936,168	32 1/2
Total.....	\$168,168,362	\$38,473,941	
Average profit.....			21

MAP OF THE MINERAL DISTRICTS OF THE CUMBERLAND RANGE

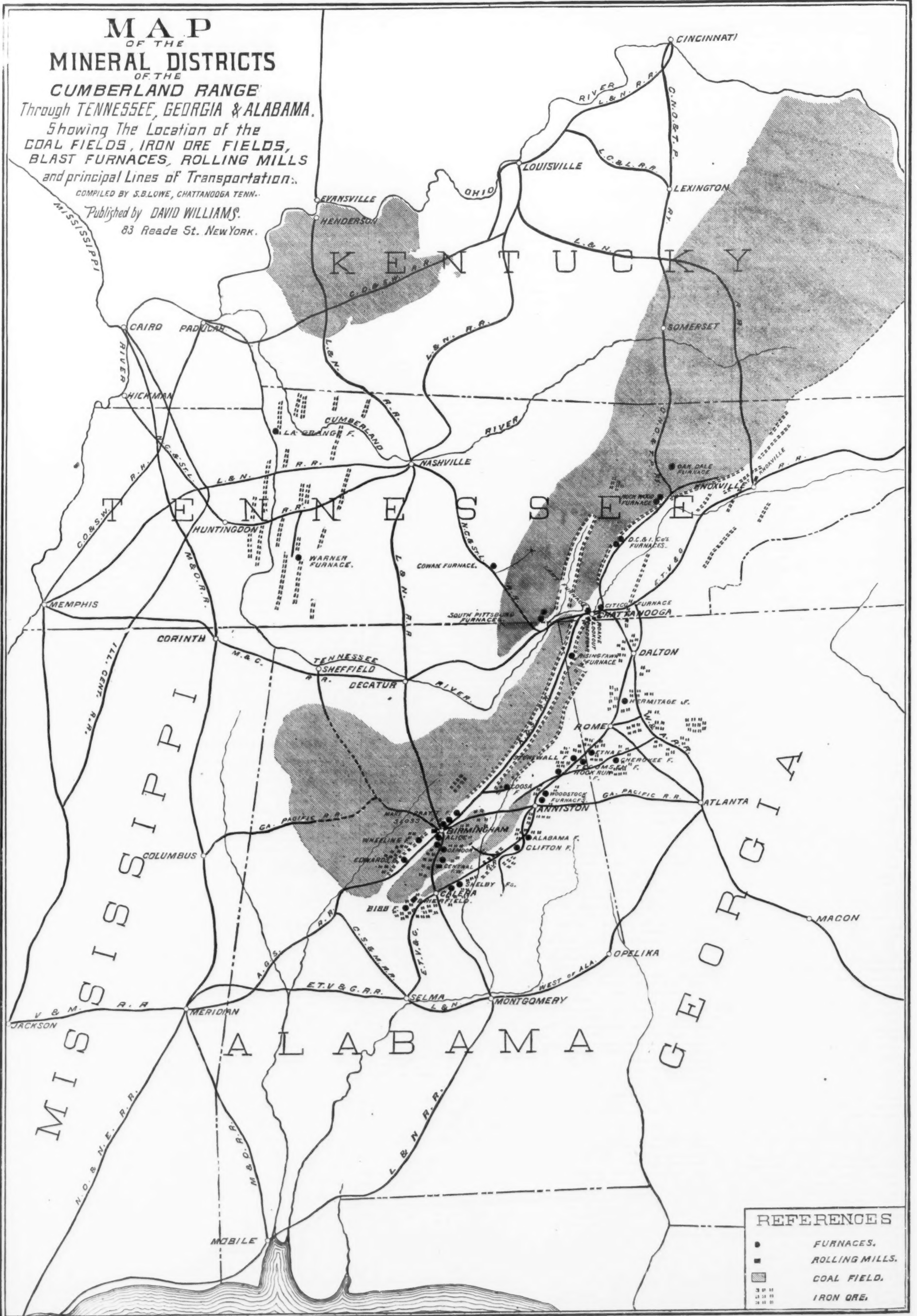
Through TENNESSEE, GEORGIA & ALABAMA.

Showing The Location of the
COAL FIELDS, IRON ORE FIELDS,
BLAST FURNACES, ROLLING MILLS
and principal Lines of Transportation.

COMPILED BY J.B. LOWE, CHATTANOOGA TENN.

Published by DAVID WILLIAMS.

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The Coal and Iron Fields of the South.

The map presented on the opposite page, which we have had specially prepared for *The Iron Age*, showing the coal and iron-ore areas of the Southern States, with the furnaces, rolling mills and the railroads and navigable rivers of the district, will be found a very interesting production. The total coal area shown covers 23,000 square miles, and the iron-bearing area is somewhat larger. The brown hematites lie in West Tennessee, North Georgia, North Alabama and East Tennessee. Some of these are very low in phosphorus, but generally carry a considerable proportion of silicon. The product of these ores, more especially those found in West Tennessee and upper East Tennessee, were famous for the boiler plate they made, and also as fine casting irons, before the war. The charcoal irons smelted from West Tennessee are rated in this country and Europe as the finest chilling irons yet used in that line of casting. The Warner Furnace, Hickman County, Tenn., ships a considerable portion of its output to England, the purchasers being manufacturers of heavy chilled and polished rolls for oilcloth, linoleum, paper and other mills requiring that kind of machinery. It is, by the English foundrymen, pronounced superior to Silesian, Swedish or English charcoal irons for their use, in fluidity, solidity after casting and ease of manipulation in the finishing processes. The same ores make superior iron for the manufacture of car-wheels, fine stove plate and for all uses where fine surface and compactness of fiber are essential.

The red fossil ores are very extensive and found in heavy beds contiguous to the coal measures along the Tennessee River about Chattanooga for a distance of 120 miles. The tributary valleys on both sides of the river, and those running parallel to the river, are also underlain with this ore in thick strata. It extends down Hills Valley from Chattanooga into Alabama to Birmingham, a distance of 130 miles, where the fossils run out and the hematites replace them. This quality of ore is similar, almost identical, with that found in the Cleveland, England, iron district. The product is a superior quality of cold-short pig iron, which is extensively used by mill managers and foundries North and South. The high-grade foundry is highly prized by manufacturers of cooking stoves and ranges, and is suitable for all ordinary foundry uses, such as pipe, heavy mill castings, &c. One of the especial inducements to smelters to use the fossil ore is the fact that with it an abundance of limestone and coal lie together, or so near each other as to reduce the item of transportation of furnace stock to the minimum of cost.

An examination of the map with reference to the finding of eligible sites for making pig iron will show that, so far as mere cost of smelting is concerned, one place is about as good as any other on a very large tract of country. While this is apparent, it is also evident that comparatively very few locations furnish the chief item, plenty of cheap transportation for obtaining stock and shipping the product. But two points in the district, Chattanooga and Birmingham, are convenient to the raw materials and are reached by trunk roads piercing the coal, ore and limestone, and reaching directly the best markets of the country. Several new towns and projected ones are well located with reference to supplies of raw material, but they are on a single line of road, and that line often passing remote from the raw materials. Sheffield, a projected town at the head waters of the Tennessee River, below Muscle Shoals, and within easy reach of the Memphis and Charleston road, is between coal and iron. Excellent beds of hematite lie to the north of it, and plenty of coal to the south, and both convenient. But a new road must be built before they are available. Other proposed future centers of iron manufacture, some of which have furnaces and others the sites of plants to be built, are similarly situated.

In many instances the furnace companies have led enterprise in building railroad feeders reaching their raw materials, and these roads are prime factors in the general development of the South in other lines of manufacture and agriculture. The furnaces on the Selma, Rome and Dalton section of the East Tennessee, Virginia and Georgia system in Alabama were originally built with a view to the use of charcoal as fuel. Having been placed within reach of coal, they are being in several instances remodeled for the use of coke, and within a few years only coke will be consumed by that group, except as to one or two to be worked for the production of car-wheel metal. All except a few of the furnaces shown on the map are of recent construction, or have been thoroughly modernized with a view to economy of production. Their total capacity in full blast would be about 650,000 tons per year, and it would be worth at the present low rates about \$9,100,000 at the furnaces. There are many other interesting features, but a study of the map will suggest them to those interested in Southern mineral development.

The prices of available coal and iron lands in the South have greatly advanced since 1880. Many sites bought a few years ago for \$500 to \$20,000 have changed hands at \$20,000 to \$50,000, and the tendency is to go steadily up. A good deal of coal and iron area not yet within reach of railroads may be bought at low rates, but they would be really dearer, if the object of the purchaser should be development, than higher-priced estates on roads or at centers of transportation. As investments the lands remote from railroads ought to be generally sought by iron or coal capitalists of the country. Not many years hence all these lands must be as eligibly located as any in the Union, and when that time arrives they will rapidly appreciate in value.

Natal Customs Tariff.—The Customs Duties Amendment law of 1884, which took effect from and after October 1, makes the following changes in the duties levied upon certain articles imported into the colony. The rate on unmanufactured articles is raised to 7 per cent. ad valorem from 6 per cent. ad

valorem, and under it are comprised the following articles: Iron bar, bolt, rod, and sheet, railway plant, ironmongery, hardware and cutlery, except picks and hoes (rated at 6d. each); agricultural implements and machines, to be exclusively used as such, hoops and hoop iron, machinery for agricultural, manufacturing, and mining operations, distillation and other chemical processes, and for preparing articles for exportation; fencing wire and iron standards for farming purposes, iron and steel rails for tramways on farms and plantations, pig iron and tin plates and tea lead, on which no duty is levied. The list of articles admitted free of duty is unaffected by the provisions of this act, except that it now includes tin plates and tea lead, but it is necessary to state that there is, apart from this act, a registration charge on all duty-free goods imported, as follows: Flour, bricks, coals, coke, patent fuel, pig iron, cement; machinery and all other free goods 1/10 per ton, or 6d per package, at the option of the collector of customs; and that there are also certain additional charges and wharfage rates levied, viz., under the Tug law, 3d in the pound on the total amount of duty in any entry, and half the registration charge on any free goods in such entry.

INDUSTRIAL ITEMS.

NEW HAMPSHIRE.

The S. C. Forsaith Machine Company, Manchester, are erecting for their own use at the New Orleans Exposition an iron building 100 x 40 feet, in which they will put power and show some of their machinery in operation. They will take out and set up five of their steam engines, besides some 75 other machines of different kinds.

MASSACHUSETTS.

The Westfield Plate Company is the name of a company just incorporated for the manufacture of coffin trimmings, at Westfield. The capital stock is \$50,000, with \$10,000 in cash, stock, &c., paid in.

CONNECTICUT.

The Coulter & McKensie Machine Company, of Bridgeport, have recently shipped to the Detroit Steel and Spring Works one of their new four-cornered presses. The peculiar features of this press are briefly as follows: Each corner is made to work independently; four different sizes of punches or slots can be used, thus avoiding change of dies. As the spring-leaf goes in across the corner, it can be handled very conveniently. This machine is well proportioned, carefully designed and very strong in all its parts. It weighs 7500 pounds.

The Cowles Hardware Company, formerly at Unionville, Conn., have removed to Bridgeport, where they occupy a new building erected by themselves. The main building is 130 x 35, with two stories and basement and an L 107 x 45, one story high. The main structure contains the finishing department, packing room and office. The forging shop, grinding and polishing rooms occupy the extension. Power is furnished by a 70-horse-power boiler and a 50-horse-power engine. The boiler and engine rooms are spoken of as models in their way, and the factory, located as it is directly on the line of the New York, New Haven and Hartford Railroad, is advantageously situated.

The Shelton Brass Hardware Company, of Birmingham, recently formed, have just completed factory buildings consisting of a foundry 40 x 100, containing 20 furnaces, and a finishing shop 35 x 100, three stories high. This company are preparing to manufacture a general line of hardware, store fixtures, ship chandlery goods and specialties in brass. Their buildings are conveniently located in Birmingham, and will be fitted up in a thorough manner.

NEW YORK.

The McQueen Locomotive Company, of Schenectady, were organized about two years ago, with a capital of \$300,000. Large buildings were put up, but manufacturing was never begun. Two assessments of 10 per cent. and one of 8 were levied on the shareholders, but the last assessment the New York shareholders did not pay. Recently Charles Stanford purchased \$150,000 worth of stock from New York shareholders, and matters are looking better than before for the company. Manufacturing may be begun next spring.

The Eddy Valve Company, of Watford, have recently built what is believed to be the largest valve ever made. It has an opening of 56 inches and is about 6 feet wide and 11 feet 6 inches high over all. It is to be used at a new mill at Niagara Falls, in connection with a water-wheel.

NEW JERSEY.

The works of the Home Rubber Company, in Trenton, were injured by fire early on Sunday morning, causing a loss of about \$70,000, as follows: On stock, \$45,000; on machinery, \$20,000, and on the building, \$5,000. Insurance about \$50,000. The cause of the fire is unknown.

Advices from Morristown, dated 5th inst., say: Though Morris County ranks third in the Union in the output of iron ore, but little is being done at present. A number of mines have stopped entirely, and others are working with one-half the usual force. Last week nearly all the mines put up notices that after the 1st of December wages would be but \$1 per day. The miners submit to the reduction. The cause is the lack of a market for ore. Some of the furnaces that formerly relied upon Morris County ore now use Spanish ore, trainloads of which pass over the railroad daily.

John H. Dial, of Camden, has received from the Government a contract to build a steel lightship tender for use at San Francisco.

PENNSYLVANIA.

A meeting of the parties interested in the proposed chain works was held at Reading on December 3, to talk over the enterprise. No action was taken, but further meetings will be held, and it is probable that the works will be established.

The Glendon Iron Company have posted a notice in their machine shops, where about 50 men are employed, announcing a general re-

duction in wages, and also advising all who can to obtain work elsewhere, as the force will shortly be greatly reduced.

Red Jacket Furnace, of the Crawford Iron and Steel Company, at New Castle, has been shut down indefinitely on account of some difficulty in obtaining stock.

The Schuylkill Haven Rolling Mills, near Port Clinton, which have been idle since August, resumed operations on December 2. They employ 100 hands.

The Phoenix Iron Company have been experimenting for a year or two past with a mechanical puddler, with which they have had a great deal of trouble, but which, from present appearances, they are now in a fair way to make a success. The last time it was in operation it ran for two weeks, making six heats a day and turning out an excellent quality of iron. It would have continued to work in all probability, but the company stopped it for the purpose of taking out the bridge in the machine which cuts the iron in two parts, with a view to introducing an improvement at this point.

Gable, Jones & Gable, lessees of Bechtelsville Furnace, are about to erect a large ore crusher at their ore mines in Boyertown, for the purpose of crushing their ore by machinery.

The Phoenix Iron Company have started up every department of their works double turn. These works are confined almost exclusively to the manufacture of iron bridges, and this branch of trade is not so seriously affected as other manufactures.

The rolling mill at Canonsburg, Washington County, has shut down in order to give opportunity for putting in pipes for the use of oil of natural gas as fuel.

PITTSBURGH AND VICINITY.

The 200 employees of the Atlas Foundry have been notified of a reduction of wages of 7 1/2 per cent., to go into effect immediately. This is the first foundry in the city in which an attempt has been made to reduce wages. The others will likely follow.

The report that the forge department of the Elba Iron and Bolt Works had started on double turn caused a great rush of mill men who were looking for work. As the watchman of the mill was unable to clear the works of intruders, a policeman was called in and the men ordered away. About 600 puddlers and helpers applied, of whom 475 were turned away.—*Dispatch*.

The Lucy Furnace Company, Limited, are having one of the finest blowing engines in the country made by E. P. Allis, of Milwaukee, Wis. Its weight will be 150 tons. Its fly-wheel is to be 25 feet in diameter, will weigh 60,000 pounds, and will run at the rate of 55 revolutions per minute. The engine will be completed about the 1st of January.

The Lucy Furnace Company, Limited, notified their employees on December 4 of a 12 1/2 per cent. reduction in wages.

The new Baltimore and Ohio Railroad Shops, at Glenwood, are about completed. They are five in number, each 90 x 100 feet. All the repairing work on the main line from Connellsville to Pittsburgh, and also on the Wheeling Division, will be done there. The shops will be heated with steam and illuminated with electric lights. At present 160 men are at work, but when complete the force will be 400.

Zug & Co. have shut down their Sable Iron Works in all departments until after the holidays.

The plate mill at the National Rolling Mill, McKeesport, is credited with having produced 2200 tons of sheared pipe iron in 22 days' work. The roughing rolls are two-high and the finishing rolls three-high, each measuring 24 x 74.

OHIO.

Brown, Bonnell & Co., Youngstown, have reduced the hours of work of all men employed by the day, paying at the old rate the number of hours employed.

The Westlake Rolling Mills, at Warren, have been closed for some months. There is some hope now that the mill will be utilized, as Pittsburgh parties are said to be negotiating for it, with the view of converting it into steel works.

The Canton Tool Company are to be reorganized soon, and become a joint-stock company under the name of the Fulton Tool and Manufacturing Company, with office and factory at Canal Fulton. The new company will continue the manufacture of high-grade steel tools for miners, masons and rail-track men, and will add some specialties. The company have recently begun the manufacture of Lalby's patent hand-drill for coal miners, and find it is favorably received.

The H. P. Nail Company, Cleveland, will have their large new works in operation in about three weeks.

The W. S. Tyler Wire Works Company, of Cleveland, with a capital stock of \$175,000, have filed articles of incorporation with the Secretary of State.

The receivers of the Youngstown Malleable Iron Company announce that the plant of that company will be offered for sale at auction in the court house of Youngstown, on the 31st of December inst., at 2 p. m. The plant is said to be complete and in excellent condition.

ILLINOIS.

Hansen & Amundsen is the name of a concern lately established in Chicago as machinists and makers of dies, tools and light machinery. The firm will make a specialty of counting machines for printing-presses. New and improved machinery has been put in, and the works are fully prepared for the work proposed.

The Sleeper Manufacturing Company have been organized in Chicago to manufacture metallic packing for steam engines and other articles for railroad use; capital stock, \$450,000; incorporators, Charles T. Sleeper and others.

The Chicago Steel Works, Chicago, report an unusually large call for cultivator attachments, some 200,000 having been sold during

the year. The company are devoting an entire building, 40 x 90 feet in size and two stories high, to this branch of manufacture, and are largely increasing their producing capacity. In the steel department of these works new shapes of machinery for manufacturing arches, beams and cultivators are being constantly brought out.

Because of the fire which recently occurred in the foundry of the Chicago Steam Boiler Works and Michigan Iron Foundry, business in that department has been temporarily suspended. The damages are being rapidly repaired, and work will be resumed in a few days.

William White & Co., of Moline, are making two double-end bending machines for the United States Rolling Stock Company, which will be ready to ship by the close of the week. These are said to be the first of the kind that have been made in this country. The combined weight is about 30,000 pounds. A drop press for the Chicago Malleable Iron Company is nearly completed. They report trade as having been quite dull during the past two months, but the present outlook is decidedly more favorable. A considerable number of orders from sawmills are in sight, and they expect to be quite busy after the first of the year.

The Moline Screw Company, of Moline, have recently been organized, with C. H. Deere as president; Thomas B. Carton, vice-president, and H. L. Bullen, secretary and treasurer. They have recently erected a three-story brick building, 64 x 64, and expect to be in operation by the close of the month. They have put in 30 screw machines of the Cook pattern (Hartford), which will be run by a 30-horse-power engine, and will give them a capacity of 500 gross per day when in full operation. They contemplate making a full line of flat-head screws up to 3 inches. The gentlemen who are at the head of this concern insure its being a valuable acquisition to the manufacturing interests of the town, and have fair prospects of success, as they are located further west than any other screw manufactory now in operation.

The John Deere Company, plow and cultivator manufacturers, of Moline, closed down on the 29th ult. The general depression in business has stocked their warehouses and buildings with the goods they manufacture to such an extent that this was their only recourse. They have a capacity of 500 to 600 plows and cultivators a day. The cessation throws out of employment about 900 men (which was the number on the pay-roll last year at this time). In all probability the works will not be in operation again for six or eight weeks, unless a decided improvement occurs in the demand between this and that time.

The Moline Plow Company are running to about three-quarters of their capacity, and claim to be in a pretty fair condition for the coming season. The depression in trade has made the curtailment necessary, but they are not so crowded with stock that an entire suspension at present would be advisable. They are manufacturing a new cornstalk cutter, which will be placed upon the market the coming season, and are working upon a new corn dropper, which they hope to have in perfect completion and ready for the trade shortly.

The Rock Island Plow Company, of Rock Island, at their meeting on the 4th inst., elected V. L. Mitchell president, and B. D. Buford temporary secretary and treasurer. The works were set in operation on the 1st, and they now have employed about 60 men. They contemplate running to their full capacity by the close of the month, which will give employment to about 500 hands. Their capacity is about 200 plows and 200 cultivators per day. The new company have very little stock on hand from the old concern, and start up under favorable auspices. They will make in addition to plows and cultivators a new steel smoothing harrow patented by B. D. Buford, and land rollers and scrapers. Several other articles will be taken up later on. It is claimed that this company have superior facilities for the manufacturing of these goods, and that their works are the most advantageous of all the implement manufacturers in the West. They have in connection with their wood works machinery for rounding and shaping wood poles, plow handles and plow beams, patented by M. S. O'Neil, which saves the labor of 18 men, and it is claimed, reduces the cost of the finished material 75 per cent. on the hand system which is in vogue in the majority of shops. The works have been closed about five months, during which time they were thoroughly cleaned and put in perfect order.

The handsomest and most attractive front in Louisville has just been completed to the Hart Block, 755 Main street. The whole of the large building is occupied by Messrs. Hart & Co., hardware merchants. This front does great credit to the designer, but more still is due to the skillful execution of the Merz Architectural Works. There are some large and intricate castings, which are so beautifully joined together as to have the appearance of one piece of work. The Merz Works are now idle for lack of orders. They will resume work in about a month.

Ainslie Cockran & Co., of Louisville, are just completing a pair of cylinders, 12 feet stroke for a mammoth Mississippi steamboat now building in St. Louis. The machinery from these shops is in use all over the West and South.

The Louisville Car Wheel and Railway Supply Company are turning out splendid car wheels, which undoubtedly will last out their guarantee. They are using the best of iron and most skilled workmen.

Thos. Meikle & Co., of Louisville, have shipped a beautiful collection of agricultural implements, particularly steel plows, to the New Orleans Exposition. One of the chief attractions will be a machine solely for the cotton planter. It is a cotton planter, just perfected by Meikle & Co., which sows the cotton seed in regular bunches, thereby saving the customary work of "chopping out." This will meet a long-felt need.

MICHIGAN.

Galvin Bros., of the Galvin Brass and Iron Works, of Detroit, have recently formed a corporation consisting of F. F. Palms, president; John Collins, vice-president; W. S. Armitage, secretary and treasurer; T. Galvin, manager, and John Galvin, superintendent. The office and works are on Warren avenue, near Grand River avenue, and the capacity is being largely increased by the tearing down of old and the placing in of new machinery, and by the erection of additional buildings. The new works comprise a foundry 40 x 80 feet, a brass foundry 60 x 35 feet, brass finishing room 40 x 107 feet, two stories, pattern-house—fire-proof and separate from main building—30 x 40 feet, and office, 25 x 40 feet. The company hope to occupy the new plant by the 15th of the present month.—*Chicago Industrial World*.

MINNESOTA.

Steps have been taken for the complete reorganization of the Northwestern Manufacturing and Car Company, of Stillwater, which recently went into the hands of a receiver. Articles of association have been drawn up which are dated November 26, 1884. The company, by virtue of these articles, will be known as the Northwestern Thresher Manufacturing Company, and the capital stock is fixed at \$7,000,000. The principal office is to be located in St. Paul, and all the financial affairs of the concern will be managed in that city. The scheme for reorganization was adopted at a creditors' meeting of the car company, held in Boston on November 25, at which there were present 100 creditors, representing nearly \$2,000,000 indebtedness. The \$7,000,000 of capital stock of the new company will be divided into 140,000 shares of \$50 each, classified as common and preferred, the amount of the former to be \$1,000,000, or 80,000 shares, and of the latter \$3,000,000, or 60,000 shares.

NORTH CAROLINA.

The Mecklenburg Iron Works, of Charlotte, John Wilkes, manager, are about to enlarge the capacity of their works to accommodate their increasing business. The principal manufactures of the Mecklenburg Iron Works, which were established in 1859, are mining machinery of various kinds, including mining pumps, reducing machinery, stamp mills, &c., bus-bars, engines, boilers, saw mills, cotton presses, &c. The plant at present covers an area of 200 x 400 feet, where are employed a force of 100 men. The trade in mining machinery manufactured at these works covers North Carolina, California, Nevada and the Pacific slope, which trade, together with the demand for their engines, boilers and other machinery, necessitates the running of the works at their fullest capacity. Among various kinds of sawmill machinery, the Mecklenburg Iron Works manufacture Ramsay's patent feed and backing device.

VIRGINIA.

Princess Furnace, at Wilton Station, Botetourt County, blew in on November 21, and is making 25 tons per day. This furnace, which is owned by Capt. D. S. Cook, was removed by him during the present year from Ashland, Ky., to its present location, near Callie Furnace. It measures 60 x 12 1/2 feet, has three Whitwell stoves, and will probably make about 200 tons a week when in full blast.

New York Prison Labor.

Hasty legislation in compliance with a popular outcry is generally apt to prove unwise, if not injurious. A very striking instance of this is given in a recent issue of the *New York Times*, as follows:

The superintendent of the prisons of this State has been forced to an experiment which is sure to be expensive, but no alternative is left to him. Persons sentenced to the State prisons must be kept at "hard labor." The law of 1877 requires that convicts shall be employed "by contract or by the State, or partly by one system and partly by the other," and the law of 1883 prohibits the making of any more contracts for convict labor. By the abandonment of one contract and the failure of one contractor 525 convicts in the Auburn prison have been thrown upon the hands of the superintendent, and he has been forced to provide for their employment on State account. He has bought the plant of the boot and shoe company and the clothing company which had the contracts, and set the men at their old tasks. They compute with "free labor" quite as much as before, but the State must buy stock and sell the products, and without a degree of care and skill which men inexperienced in the business, and having no personal stake in it cannot be expected to exercise, there will be extravagance and loss. This forced change of system, without a chance for consideration or discretion, is a misfortune for which the Legislature is responsible, and for which the taxpayers will have to foot the bill. The contract system ought not to have been abolished until a well-considered substitute had been provided for it.

Professor Ratti has devised a new battery based on the production of electric current through the difference of temperature of two states of one and the same substance. Two copper pipes, fixed a slight distance apart, pass through the wooden or porcelain cell containing a solution of sulphate of copper, and are traversed, the upper one by steam and the lower one by cold water. When the circuit is closed, the copper of one pipe becomes dissolved and deposited on the other.

The prospects are now that elevated railroad trains will be rattling through the streets of Brooklyn before the 1st of next February, says the *New York Times*. How rapidly the work has been carried on this fall may be readily seen from a walk along the curiously crooked route. About 80 tons of iron a day have been put in position. From the bridge, through York street to Hudson avenue, to Park avenue, to Grand avenue, to Lexington avenue, and thence to Broadway, the tracks are very nearly completed.

The Cuban Reciprocity Treaty.

We copy from the New York Times a large part of the text of the new treaty with Spain, which establishes reciprocity in trade between Cuba and the United States. By means of it Spain will admit to Cuba and Porto Rico American goods, and the United States will admit goods from Cuba and Porto Rico at rates specified in the subjoined treaty and the annexed tariff schedules. It has long been the policy of Spain to maintain a system of discriminating duties on imports to the colonies and to extend great favors to trade with the mother country in Spanish bottoms. On goods brought from any foreign country under the Spanish flag duties three times as large as those included in what is known as the first class of Spanish duties were levied, while on foreign goods brought in foreign vessels the highest duties of all were imposed. Under this system, of course, anything sent under the American flag from the United States to Cuba or Porto Rico paid a crushing duty. The average was about 30 per cent. above what would have been paid had the goods gone in a Spanish ship. We present below the most important provisions of the new treaty. It may be remarked that nearly all the duties are levied on the unit of 100 kilos, or about 220 pounds. The smaller articles and textiles are taxed by the kilo, or 2.2 pound, and carpets by the square meter or (approximately) the yard. In a few cases which will be readily recognized the tax is levied on the piece. Separate schedules marked Care drawn up to cover trade between the United States and Porto Rico, but in their main features they closely resemble the Cuban schedules:

Article 1. The United States agree to admit into all the ports of entry of the said States, free of import duties, or with the duties to which they are subjected in the accompanying tariff marked "A," all the articles or merchandise enumerated in the same, provided always that said articles or merchandise enumerated in said tariff "A" shall be natural products or products of the industries and manufactures of the Spanish isles and provinces of Cuba and Porto Rico; and, moreover, provided always that the said articles or merchandise be transported directly from the said isles to the United States in bottoms, which shall be the exclusive property of citizens of the United States or of Spanish citizens, and whose officers shall be, respectively, citizens of said United States or of Spain. If, during the existence of this treaty, any reduction is made in the import duties of the United States upon any article or articles among those enumerated in the tariff upon which duties are imposed, the duties of the said tariff "A" shall be proportionally reduced upon said articles.

Article 2. Spain agrees to admit into all ports of entry of the Spanish isles and provinces of Cuba and Porto Rico, free of import duties, or with the duties imposed in the annexed tariffs marked "B" and "C," respectively, all the articles and merchandise enumerated in said tariffs, provided always that the articles or merchandise enumerated in said tariffs "B" and "C" shall be natural products or products of the industries or manufactures of the United States, and, furthermore, that said articles or merchandise shall be transported directly from the United States to the said isles in bottoms which shall be the exclusive property of Spanish citizens or of citizens of the United States, and whose officers shall be respectively Spanish citizens or citizens of said United States. If, during the existence of this treaty, any reduction in the third column of the customs tariff of Cuba or of Porto Rico, or in the column in force, in case said third column shall be replaced by another, in regard to any article or articles of those named in tariffs "B" and "C" upon which duties are imposed, the duties of said tariffs "B" and "C" upon said articles shall be proportionally reduced. Articles or merchandise, whether natural products or products of the industries and manufactures of the United States, not included in the tariffs "B" and "C" mentioned, shall pay on their importation into the Spanish isles and provinces of Cuba and Porto Rico the duties fixed in the third column of the respective customs tariffs now in force, or the duties fixed in the column of the customs tariff that may be in force during the existence of this treaty, without differential duty of flag.

Article 3. Goods or merchandise transported directly from ports of entry of the United States, and not natural or industrial products or products of the manufactures of said United States, shall not pay, on their importation at the ports of entry of the isles of Cuba and Porto Rico, other duties than are imposed and collected upon similar and equal goods or merchandise likewise transported directly in Spanish bottoms from the ports first named, on condition that they are not original products of the United States. Reciprocally, goods or merchandise transported directly from ports of entry of the isles of Cuba and Porto Rico in Spanish bottoms, and which are not natural products or products of the industries or manufactures of said isles, shall not pay, on their importation at the ports of entry of the United States, other duties than are imposed and collected upon similar and equal goods and merchandise likewise transported directly in American bottoms, on condition that they are not original products of said isles.

Article 4. The high contracting parties reserve to themselves the right of framing such laws, ordinances and regulations as may appear advantageous to them to protect their revenues and prevent fraud.

Article 5. In the Spanish isles and provinces of Cuba and Porto Rico no new or higher export duty or tax than is established by the tariffs now in force shall be imposed. Any rebate which may be made in said tariffs, in respect to export duties, shall be applied immediately to merchandise referred to in tariff "A." In the United States no export duty or tax shall be imposed upon the articles or merchandise referred to in tariffs "B" and "C."

Article 6. None of the articles or merchandise enumerated in tariffs "A," "B" and "C," whether the said articles be products or exports of the United States or of the Spanish isles and provinces of Cuba and Porto Rico, which are imported into said

islands or the United States, can be made dutiable on account of consumers' taxes or internal imposts of any kind in a greater degree than is done in respect to articles or merchandise of a like nature and of the national production of either one of the two contracting powers.

Article 7.—Manufacturers and merchants, as well as commercial travelers, of the isles of Cuba and Porto Rico who visit the United States for the account of a firm in said Spanish provinces, and, reciprocally, manufacturers, merchants and commercial travelers of the United States who visit the isles of Cuba and Porto Rico on account of a firm in the said United States, can, without being subject to any duty, either in the United States or in the isles of Cuba and Porto Rico, make the purchases required by their calling, and take orders with or without samples, without, however, carrying merchandise.

Article 8.—Objects upon which an import duty is laid, if introduced as samples into the isles of Cuba and Porto Rico by manufacturers, merchants or commercial travelers from the United States, or introduced into the United States by manufacturers, merchants or commercial travelers from the isles of Cuba and Porto Rico, shall be admitted by both contracting parties under a temporary immunity from taxation, on fulfillment of the necessary custom-house formalities, guaranteeing the re-exportation of the same objects or their return to the custom house.

Article 9. The contracting parties reserve to themselves the right to establish regulations of the importation and exportation of gunpowder, dynamite and other explosives.

Article 10. American ships proceeding directly from any port or ports in the United States, with a full cargo of articles or merchandise, natural or industrial products or products of the manufactures of said United States, or partly of foreign origin, shipped or transhipped in said port or ports, to the isles of Cuba and Porto Rico, shall be exempt from all tonnage dues of every nature, and, in respect to port dues, pratique charges, pilotage, hospital taxes and other usual local taxes, they shall pay no other nor larger fees than are exacted of Spanish vessels employed in trade between said isles.

Article 11. Reciprocally, Spanish vessels shall be exempt in any port or ports in the United States from all tonnage dues of whatever nature, and, in respect of harbor port dues, pratique charges, pilotage, hospital taxes and other usual local taxes, they shall pay no other nor larger fees than are exacted of American vessels employed in trade between said isles and said United States.

Article 12. Vessels which as to cargo and the port from which they come are within the conditions of the two preceding articles shall have freedom to go from one port to another in the territory or island of their destination, unloading or discharging what they bear to said different ports.

Article 13. Ships coming within the conditions stated in Articles 11 and 12 shall have no right, whether American or Spanish vessels, to receive on board or ship in any port of the country of their destination any kind of cargo to be carried to any port of the same nation, in the States and islands already mentioned, the local coasting trade being reserved exclusively to the flag of each of the high contracting powers in their respective territories.

Article 14. The consular officers of the United States and Spain shall not claim nor collect, while this treaty is in force, any of the fees enumerated in the tariff of consular charges of the United States and Spain as compensation for official services rendered to vessels of the United States or of Spain engaged in trade between said United States and the isles of Cuba and Porto Rico.

Article 15. The two high contracting parties mutually agree that neither the customs authorities of the United States nor those of the isles of Cuba and Porto Rico shall impose fines or penalties upon Spanish or United States vessels, or upon their captains, employed in the import or export trade between said United States and isles, for errors or omissions in the manifest of any portion of the cargoes of said vessels, if it shall appear that said manifests agree with their officers' knowledge of said cargoes, and unless it be proved that the captains or owners of the vessels have conspired in the attempt to defraud the revenue by said omissions or errors.

Article 16. In the isles of Cuba and Porto Rico the citizens of the United States, and, reciprocally, in said United States Spanish citizens, shall enjoy for their professions, industries and business of every nature, whether carried on individually, in partnership or as a corporation, the same rights and advantages that are enjoyed by the citizens of the territory in which they reside, with the condition, however, that they shall be subject to the laws of the land; they shall furthermore have free and ready access to the courts of justice to institute actions and defend their rights.

Article 17. Citizens of the United States residing or traveling in Cuba, and, reciprocally, Spanish citizens residing or traveling in the United States, shall not be subject to other or higher taxes than are laid upon the citizens of the nation to which the territory of their residence belongs; they shall not be liable to any personal service in the army, navy and national militia, and shall be exempt from all war taxes, forced loans and military charges and contributions of every kind, and their vessels, cargoes, merchandise or other property shall not be embargoed for any public purpose whatever without a previous indemnity fixed upon a just and equitable basis through experts and an arbitrator designated by the contestants. Moreover, they shall reciprocally enjoy in the territories referred to the privileges, immunities and benefits of every nature which have been granted or may be granted to the citizens of a third power.

Article 18. Each of the high contracting parties reserves exclusively for its citizens the right of fishing in the waters of its respective territory, but the catch by vessels of either power fishing on the high seas or within the jurisdiction of a third power shall be considered as the product of the nation represented by the vessel.

Article 19. Each of the two high contracting powers binds itself to extend to the

other, in the United States and in the Spanish provinces of Cuba and Porto Rico, reciprocally, all favors and concessions relating to the customs tariffs, commerce, navigation and property that are or may be conceded to a third power, with the understanding that the favors and concessions granted said third power shall be enjoyed gratuitously, if conceded gratuitously, said other contracting party giving the same compensation or other equivalent if the concession has been made conditionally.

Article 20. The stipulations of this treaty shall not prevent the high contracting parties from making such reforms in their tariff of customs and navigation duties as they may deem expedient, nor shall they restrain the freedom of action of either of the contracting parties in treating and concerting with other powers as to what they consider their interests may require, in giving to the same powers, by means of treaties, protocols and other international compacts, equal or similar franchises, drawbacks and benefits stipulated in this treaty, under the same or similar conditions.

Article 21. The two high contracting powers agree that the doubts which may arise as to the interpretation or execution of this treaty or the claims which may grow out of the violation of the same shall be submitted, when the means of settling them directly by an amicable agreement shall have been exhausted, to a single arbitrator, who shall be a citizen of one or the other of the two nations, appointed by common consent of both Governments, or, in case of disagreement, a citizen of a third power, chosen by common consent by the same Governments. In default of this agreement the appointment of the arbitrator shall be entrusted to the President of the Swiss Confederacy.

Article 22. This treaty shall be ratified by the President of the United States, in accord with the opinion and approval of the Senate of the United States, and by Spain, in accordance with the law which authorizes its Government to make a treaty and put it in force 30 days after its official publication by the two Governments in accord. To effect publication on the same day, this shall not take place until the Congress of the United States shall approve the necessary laws to put the treaty in force, and until both Governments have adopted corresponding regulations, which shall be done within six months, computed from the date on which the treaty is signed.

Article 23.—The present treaty shall endure seven years from the date on which it is put in force by both contracting parties, in accordance with the foregoing article, and continue effective until one of the same contracting parties makes known, one year in advance, to the other its intention and decision to hold it as ended at the expiration of 12 months, computed from the promulgation of this resolution. Each of the contracting parties shall have the right, when the term of seven years shall have expired, or subsequently to that period, and at any time thereafter, to notify the other of the resolution referred to in the previous clause.

SCHEDULE A.

Articles the product of the provinces of Cuba and Porto Rico to be admitted into the United States on the following conditions: Free of duty: Horses, cocoa, coffee, fish, fresh fruits, cotton, hemp, flax, hides, skins undressed, indigo, dye woods, minerals, palm oil, sugars not above No. 16 Dutch Standard in color, tank bottoms of concentrated molasses, syrup of sugar-cane juice, melada, molasses, seeds, woods, cast iron, eggs, honey, wax, sponges, bones, guano, manure, coca, esparto, horse hair, rushes, osiers, straw, coins of gold or silver. Subject to duty: Cigars, cigarettes, cheroots (bегueros), \$1.25 per pound, 12½ per cent. ad valorem; tobacco in leaf, more than 100 leaves to the pound, unstemmed, 37 cents per pound; stemmed, 50 cents; other tobacco in leaves, unstemmed, 17½ cents per pound; tobacco stems, 7½ cents; tobacco manufactured of every kind, tobacco stemmed, 20 cents per pound; snuff and snuff flour, 25 cents per pound; tobacco not manufactured, 15 per cent. ad valorem.

SCHEDULE B—FREE OF DUTY.

Articles the product of the United States which shall be admitted into Cuba free of duty: Beer, fresh meats, bacon, fruits, salt-water fish, seeds and other cereals excepting rice, flour of cereals other than rice, lard, beef, cheese, eggs, thread, woods of all kinds, staves, knees, timber, pipes, yokes of wood for cattle, sheep, goats and hogs, stones and earths employed in construction and in the arts and industries, clay in tiles, bricks and tiles unglazed, hides and undressed skins, minerals or metals, coins of silver and gold, useful tools, agricultural implements, agricultural apparatus, industrial and scientific motors of all classes and materials, separate parts of the same, raw cotton, hemp, flax, jute, abaca, pita and all other raw vegetable fibers, wools, bristles, hair, raw horse hair, asphalt, bitumen, tar, pitch and rosin, petroleum, raw or crude, mineral and vegetable oils, mineral waters, trees, plants, vine shoots and seeds, natural and artificial manures, marble, ja-per, alabaster in blocks and sheets, rough or prepared, other stones and earths employed in construction, minerals and metals, ice, clay in bricks for building, cast iron in pigs, and all forms of waste steel and iron, cast-iron tubes, the same manufactured, wrought iron and steel in bars, and all kinds of iron in wire, nails, screws, nuts, common iron tubes, wire gauze, unmanufactured.

Class C.—Substances used in chemical industries, drugs, cotton and other oil seeds and products of the same excepting bark oil, tanning liquids, tallow and all other animal grease unmanufactured and not otherwise specified in this schedule.

Class D.—Cotton and its manufactured forms, raw cotton with or without seeds.

Class E.—Other vegetable fibers and their manufactured forms, hemp, flax, jute, abaca and all other raw vegetable fibers.

Class F.—Raw wools, hair, horse hair and their manufactures.

Class G.—Printed papers or lithographs, periodicals, pamphlets, books bound or unbound, music paper.

Class H.—Woods of all classes in logs, beams, boards, rounds, sawed or planed, piles, wooden hoops, pipes, boxes of wood, ordinary or finished doors and blinds, un-

painted and unvarnished; common wood, manufactured in all shapes.

Class I.—Cattle, asses, mules, horses, swine, sheep, goats, hides, undressed skins, natural and artificial manures.

Class J.—Utensils, agricultural implements, machines and apparatus, materials for public works, materials of all classes for construction or repair of ships.

Class K.—Birds, terrestrial and aquatic, meats, fresh, salted, pickled, and smoked, except jerked beef, bacon, hams, lard, tallow, cows, live sea fish, fish dry-salted or pickled, rice shelled or unshelled and other cereals, flour or other cereals except rice, fresh, dried or preserved fruit seeds, fresh and dried vegetables, beers of all kinds, cheese, eggs, hay and straw for forage, trees, plants, vine shoots, garden seeds, sugar bags.

SCHEDULE B—DUTIABLE.

Articles produced and manufactured in the United States to be admitted into the island of Cuba on the following conditions: Wheat, 50 cents per 100 kg.; wheat flour, \$3 per common barrel; starch, pastes, fecula, \$2; manufactured wood, \$3; fine worked and carved wood, \$10; manufactured wood inlaid, gilded with various ornaments, \$20; traveling carriages, steel and iron for the same, \$2; other vehicles, and wood and iron for the same, \$1; passenger cars, \$1; marbles, jaspers, alabasters, in all classes and sizes, 30 cents; the same worked, \$1.80; common hollow glass, \$1.50; imitation of crystal, \$5; plate glass, \$2.70; glass or crystals silvered and crystals for watches, spy-glasses, \$10; mosaic tiles, 60 cents; crockery of stone and fine clay, \$3; porcelain, \$5; calf skins, glazed, 20 cents; other skins, tanned for soles and machinery, 10 cents; ready-made shoes, leather, \$1.25; articles for saddlery, 40 cents; printing paper, white or colored, \$1.80; writing paper and lithographic and engraving paper and card board, \$4; the same in sheets for letters, cigarette paper, ruled or unruled, \$6.50; paper printed or lithographed in Spanish, periodicals, pamphlets, \$5.40; the same in foreign tongues, \$2; prints, photographs, maps, playing cards, 25 cents; wall paper, \$6; prepared colors, dyes, bituminous matter (betunes), \$1.25; tobacco, in leaves and carots, \$3.50; cast iron, 25 cents; cast iron in pipes, 90 cents; do., of fine manufacture and glazed, \$2.50; forged iron and steel, \$1; do., in large pieces, \$1.30; wire, nails, screws and wire gauze of same material, \$2; do., of fine manufacture, \$5; tin plate in sheets, \$2; do., worked, \$5; needles, pens, watchworks, 50 cents; knives, scissors, razors, 15 cents; copper, bronze, brass, nickel, \$2; do., in sheets, pipes, nails or wire, \$5; do., manufactured, \$13; do., manufactured as gilded or plated objects, \$40; all other metals, \$1.50; do., in sheets, leaves and pipes, \$2.50; do., manufactured, \$5; do., gilt, plated or nicked, \$15; gold watches, \$1 each; all other watches, \$1 25; clocks and chronometers, \$1 each; all other clocks, 25 cents each; textiles of cotton, close woven, plain, crude, white and colored, 10 threads, 10 cents; from 11 to 17 threads, 20 cents; from 17 to 22 threads, 30 cents; from 23 to 28 threads, 50 cents; exceeding 29 threads, 75 cents; do., close woven, printed handkerchiefs and ribbons, in pieces up to 10 threads, 20 cents; from 11 to 16 threads, 30 cents; from 17 to 21 threads, 50 cents; from 22 to 28 threads, 75 cents; exceeding 29 threads, \$1; textiles, in pieces, close woven, crossed, crude, white and colored handkerchiefs and ribbons, 20 cents; do., printed, 35 cents; diapered and plain textiles, up to 20 threads, 35 cents; over 20 threads, 75 cents; do., worked by loom, broadened, up to 20 threads, 50 cents; exceeding 20 threads, \$1; quilts, blankets, cotton flannel, textiles and feltings, 25 cents; cloths, 50 cents; tulle, lace edgings and crochets, 75 cents; lace, 50 cents; do., plain or mixed fiber, 4 cents; do., plain to 10 threads, 14 cents; from 11 to 15 threads, 22 cents; from 16 to 20 threads, 45 cents; from 25 and upward, 85 cents; do., crossed, 21 cents; do., crossed, white and printed, 34 cents; lace, 80 cents; carpet, 5 cents; pure wool or mixed carpet, 20 cents; felt, 10 cents; felt blankets and other pure woolen goods, 12 cents; lace goods, 75 cents; broadcloth and other cloths, \$1.50; do., with a wool, 75 cents; other pure woolen textiles, 70 cents; do., with a wool, 50 cents; do., pure wool, \$1.50; do., vegetable textiles, 75 cents. Textiles embroidered by hand, or hand and machinery, with metallic threads, shall pay 25 per cent. additional to above; ready-made clothing, 30 per cent. additional to above; refined petroleum, benzine, \$1; common soap, \$3.

The President said to-day that the Labor Bureau had given him more trouble than an entire executive department. He had at first appointed Mr. Jarrett upon what he regarded as ample grounds, but no sooner had the announcement been made than he received letters from those most interested, showing that it would not be judicious to intrust this bureau to his charge. It is evident that thus far the labor interests have not presented a candidate for this place who is competent by ability, statistical experience, training and education to fulfill the duties. The President has been so much annoyed that it looks now as if he would leave this office as an official legacy to President-elect Cleveland.

WASHINGTON NEWS.

(From Our Regular Correspondent.)

WASHINGTON, D. C., December 9, 1884.

Colonel Morrison, in conversation with the correspondent of *The Iron Age*, said to-day that, while there had been no conference as yet upon the general question of tariff reduction, he had no doubt that a caucus or conference would be held soon to determine upon what action, if any, should be taken in the premises. He said that this work had been inaugurated and should not be passed over as a defeat; that the elections were by no means conclusive to his mind as to popular disapprobation; in fact, as far as he was immediately concerned among his own constituents, his course had been emphatically approved, and he was in favor of taking a position, whether any further actions were taken during the few remaining weeks of the Forty-Eighth Congress or not. He thought that this would put the question in shape for the next Congress.

THE LABOR BUREAU.

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THE RESULTS OF THE TARIFF.

Mr. Nimmo, chief of the Bureau of Statistics, has completed his annual statement of imports, and in the same connection shows the results of the tariff legislation in the United States from 1789. He also shows that the average ad valorem rates of reduction were on iron and steel and manufactures thereof, 3.04 per cent.; on clothing wool, 11.36 per cent.; on combing wool, 8.57 per cent.; carpet wool, 2.82 per cent.; and manufactures of wool, 2.26 per cent. The average ad valorem duties were raised on sugar, manufactures of cotton, earthen and china, and glass and glasswares, spirits, wines and malt liquors.

REVIVAL OF AMERICAN SHIPPING.

In the Senate, on the 4th inst., Mr. Cameron, of Pennsylvania, submitted the following resolution, which he desired to lie over and be printed, saying that he would take an early opportunity to call it up for consideration:

Whereas, the shipping trade in American vessels is and has for years been depressed, and the export trade in American produce is languishing for want of a market that might be reached if the shipping trade was in the hands of the citizens of the United States, therefore,

Resolved, That the Committee on Finance be and is hereby directed to inquire whether it would be expedient to expend the surplus revenue of the United States, or any portion thereof, for the purpose of reviving the shipping and export trade by allowing a rebate from tariff duties on foreign goods imported in ships built and owned in the United States, and by also allowing a premium on American grown products and articles of American manufacture exported in American vessels, and report by bill or otherwise.

THE NAVAL APPROPRIATION.

The action of the House on the 3d inst. in appropriating a second lump sum for the requirements of the navy for the last half of the present fiscal year, upon the basis of last year's appropriations, is an indication that no provision is to be made to begin work at present on any more new steel cruisers. This is the point upon which the Naval Conference Committee split during the last session.

FAST MAILS FOR CONTINENT OF EUROPE.

With a view to securing the services of the fast steamers sailing from New York in conveying all correspondence for France, the Netherlands, Belgium and Germany, some of which has heretofore been sent by direct steamers from New York, Boston, Philadelphia and Baltimore, the Postmaster-General has directed that hereafter all such matter shall be made up in mails at New York, and sent, with other correspondence for Europe, invariably by the fastest vessels sailing from that port. The new order is in accordance with a suggestion contained in the report of the superintendent of foreign mails, that the benefits to the business public arising from the use of the fastest vessels in the conveyance of the English correspondence be extended to the mails intended for other European countries.

TWO TREATIES SIGNED.

The Hawaiian treaty was signed on the 6th inst. by Mr. Frelinghuysen, for the United States, and Mr. Carter, representing the Hawaiian Government. The San Domingo treaty has also been signed by Mr. Frelinghuysen and Don Manuel Galvan, the Dominican minister.

BILL TO SUSPEND SILVER COINAGE.

Representative Buckner, of Missouri, chairman of the Committee on Banking and Currency, introduced on Monday a bill to suspend the coinage of the silver dollar for the term of three years from the 4th day of March, 1885, and authorizing the President to open correspondence with such European and American Governments as he may deem advisable, and urge upon them the desire of the Government and people of the United States for the establishment of a common ratio between gold and silver, and by international agreement securing fixity of relative money value between these metals, and whenever any three of the European Governments, including that of Great Britain, shall concur in the importance and propriety of such international agreement, the President is directed to invite a conference at such time and place as may be agreed upon of delegates from the said several Governments of Europe and America.

The Manufactures of Los Angeles.

A correspondent of the San Francisco Bulletin thus describes the industrial activity in the chief city of Southern California: "The most encouraging feature in the business growth of the city is the great increase of manufacturing establishments, and they all seem prosperous. Among the most important of these home industries are the woolen mills, 2 soap-making establishments and chemical works, 3 furniture factories, cracker factory, 3 foundries, 5 planing mills, 10 carriage factories, 2 flour and feed mills, 2 ice factories, fruit-drying, fruit-preserved and fruit-canning factories, pipe-making works, 2 soda-water factories and the salt works which now supplies the greater portion of Southern California and the Territories with this staple. The above list does not comprise over one-fourth of the manufacturing industries of the city, and, if they continue to increase, the time is not far distant when Los Angeles will contain 50,000 inhabitants. Since 1878 the exports by rail have increased fourfold, and the shipments by steamer and sailing vessel in proportion. One furniture establishment in the city is actually making regular shipments to points in Texas, and all along the line of the Southern Pacific in Arizona."

The first railway locomotive which was introduced into Australia has been consigned to a resting place in the Technological Museum, at Sydney, where it will remain to remind the colonists of early days. The locomotive arrived in Australia on the 13th of January, 1855, or not quite 30 years ago, and since then it has covered an enormous mileage. The engine was built by Stephenson & Sons, of Newcastle-on-Tyne.

Hon. Wm. D. Kelley on Hawaiian and Mexican Reciprocity.

Hon. Wm. D. Kelley, of Philadelphia, in a letter in the *Press*, discussing the Hawaiian treaty, says:

It was my privilege to resist, in the Committee on Ways and Means and the floor of the House, the legislation which was to give effect to that treaty. Apart from the injury I believed it would do to the sugar industry of the Pacific coast and to the revenues of the Government, I added the suggestion that it would inevitably lead to the early extinction of the Hawaiian peasantry, of whom but 40,000 were outside of the asylum for lepers, who were the remnant of a feeble and perishing race. This argument elicited the reply that, as we had civilized these people, their weakness should be regarded as an appeal to us for countenance, assistance and, if need be, protection.

My views were overruled and the treaty went into effect. Claus Spreckles & Co., having meanwhile possessed themselves of the sugar lands of the islands, began the settlement on these lands of Chinese and Hindoo laborers in such numbers as to entirely change the character of the laboring population of the islands and cause the practical extermination of the Hawaiian peasantry. This firm took possession, not only of all available Hawaiian territory, but of the Government. From the enormous and annually increasing gratuity the treaty bestows on Spreckles & Co. the firm provides an allowance to the king for his support and the maintenance of his civil list, every person on which is a creature of the great beneficiaries of our Government, Claus Spreckles & Co.

What has occurred in Hawaii will be repeated on a larger scale in Mexico if the pending Mexican and Spanish treaties shall not be defeated, for unscrupulous American speculators have bought up large tracts of the sugar and corn lands of Mexico which are in closest proximity to our borders, together with such rich iron deposits as those of Durango, and now only await final favorable action on the Mexican treaty to begin the importation of Chinese and Hindoo labor, *a la* Spreckles & Co., into Mexico. How far will our exclusion of Chinese labor from our territory benefit the working people of the United States when, supplemented by Hindoos and Chinese, semi-barbarous Mexicans can produce iron, sugar and many other staple articles upon our borders and send them free of duty into our markets? The interests of the agricultural and manufacturing laborers of the United States, in my judgment, demand the rejection of the Mexican and Spanish treaties, and the prompt abrogation of the treaty with Claus Spreckles & Co., known as the Hawaiian Reciprocity Treaty.

BUSINESS TROUBLES.

An Associated Press telegram says that the Mechanicsburg Machine Company, manufacturers of grain drills at Mechanicsburg, Ohio, have made an assignment to Pearl J. Burnham. The liabilities are estimated at \$150,000, with nominal assets at \$100,000. The failure of the company caused the assignment of John C. Baker, its president, and Jasper N. Shane, its superintendent. The company had been in business about 10 years.

It is reported that the Knotwell Iron Company, of Knotwell, Mo., have been placed in the hands of a receiver. The furnace has been idle for some time past, but the company have real estate worth probably \$10,000. The Standard File Company, whose works are situated at South Hanson, Mass., are reported embarrassed, the works having been attached for about \$2800. The embarrassment, it is thought, will be only temporary, as the company are said to be backed by a large capital.

A press dispatch from Racine, Wis., says: The J. I. Case Plow Company made an assignment to Charles Lee on the 8th inst. for the benefit of its creditors. The liabilities are \$750,000 and the assets \$668,000. All of this, excepting from \$50,000 to \$60,000, is owing to J. I. Case. The failure is due to the fact that in the first four years of its existence the company manufactured a kind of goods that could not be sold. This stock was turned back on the factory and was a heavy load. Usually 250 men were employed, but recently the number was reduced to 100. The company was incorporated November 28, 1876, and was known as Case, Whiting & Co. The capital stock was \$120,000, and was subsequently increased to \$150,000, but was not all paid up. The reorganization of the concern to the J. I. Case Plow Company occurred July 3, 1878, and the present officers of the company are J. I. Case, president; George Q. Erskine, secretary, and W. T. Bull, treasurer. It is said the failure in no way embarrasses the millionaire owner of Jay-Eye-See, the phenomenal trotter. Outside creditors precipitated the failure by attaching the plant of the plow works, and the assignment was made to head off local creditors who were preparing to secure their claims. It is believed that outside creditors will not realize 10 cents on the dollar. The enterprise was in no way connected with the Case Thresher Works, which are mainly owned by Mr. Case. These works, after six weeks of idleness, started up to-day, giving employment to 1000 men.

The Riverside Furnace, at Wheeling, W. Va., is endeavoring to emulate the achievements of its big brothers at Pittsburgh. This furnace is 17 feet in the boshes by 75 feet high, with iron pipe hot stoves. The furnace was banked on October 5 for about four weeks. On resuming and getting in working order it made the following show-

ing by days. The pig iron is cast in chills and rated at 2240 pounds to the ton. The product is all No. 1 Bessemer:

First week.	Second week.	Third week.	Fourth week.
T. lb.	T. lb.	T. lb.	T. lb.
107,170	122,120	131,950	138,140
116,240	125,290	139,170	138,160
117,600	130,210	137,50	137,160
114,550	127,150	138,130	138
122,710	128,230	136,630	140,290
122,850	140,150	133,130	144,690
138,190	135,170	138,650	143,130
829,70	901,120	935,30	990,230

Weekly average.....913,170
Daily average.....130,1216
Total four weeks.....3,655,450
Daily average during the last week.....141,1737

This, it occurs to us, is most excellent work. We do not now recall a furnace of this size provided with iron stoves that has made a better record. If there is, we should be glad to see the details of the work done.

A New Steel Yacht.

At Greenpoint, L. I., Piepgras & Pine are building for Mr. Woodward, of this city, a steam yacht which will be in her model and general style somewhat of a departure from the usual type. She will be built throughout in accordance with Lloyd's British requirements, of mild steel which has been tested up to the limit of 60,000 pounds to the square inch for its tensile strength. The keel is of the "flat-bar" style of construction, $5\frac{1}{2} \times 1\frac{1}{2}$ inches, and the stem the same; stern-post is $5\frac{1}{2} \times 2\frac{1}{2}$ inches. Her frames are $2\frac{1}{4} \times 2\frac{1}{4} \times \frac{1}{4}$ angles, and they will be placed 18 inches apart along the midship body, but spread 22 inches apart at the ends. They will be stiffened by reverse angles, 2×2 , in the wake of the engine and boilers, and 10 feet beyond at each end. The floors will be of $\frac{1}{4}$ -inch plate, 19 inches deep over the keel, and they will extend out in the bilge as high as the "second futtock" head, where they diminish to a depth of 6 inches. They will be topped by the reverse frames. Longitudinal strength will be furnished by a "center-plate" keelson $\frac{1}{4}$ inch thick, topped with double $3\frac{1}{2} \times 3\frac{1}{2} \times \frac{1}{2}$ angles, and two plate bilge keelsons, $6\frac{1}{2} \times \frac{1}{2}$, extending fore and aft 10 feet beyond the engine and boiler space. These will be topped and connected to the outside plating by double $2\frac{1}{2} \times 2\frac{1}{2}$ angles. The engine bed and boiler keelsons will be four in number, of $\frac{1}{4}$ -inch plate and topped with $2\frac{1}{2} \times 2\frac{1}{2}$ angles. The lower-deck stringers will be of double angles, 3×3 , wrought back to back, and a single stringer 3×3 extending clear fore and aft. In the wake of the propeller shaft there will be wrought also an extra stringer of $2\frac{1}{2} \times 2\frac{1}{2}$ double angles, back to back, and a stringer 40 feet long, of single angle, $2\frac{1}{2} \times 2\frac{1}{2}$, on each side will afford support to her stern. She will be plated flush from the gunwale down to the "A" strake with plate $\frac{1}{4}$ inch in thickness, the guardboard and gunwale strakes being $\frac{1}{2}$ inch thick.

Her hold will be divided by five athwartship water-tight bulkheads into six water-tight compartments, and a longitudinal vertical bulkhead on each side of the keel, and extending along the engine and boiler space, completely isolates her machine power from all other portions of the vessel that are below the deck. Care has been exercised in the placing of her "collision" bulkheads, and at the fore end of the stuffing-box will be built an athwartship bulkhead to afford extra security in case of accident to the propeller-wheel or its shaft. All bulkheads will be built of $\frac{1}{4}$ inch plate and stiffened with vertical $1\frac{1}{2} \times 1\frac{1}{2}$ angles placed 18 inches apart. The upper-deck stringer will be of $\frac{1}{2}$ inch plate and 16 inches wide. Beams will be of $3\frac{1}{2} \times 3\frac{1}{2}$ and 3×3 angles. The upper-deck "tie-plates" each side of the hatches will be $4 \times \frac{1}{2}$ inches. The upper deck waterway will be wrought of white pine, "log style," and will be tipped by a yellow-pine plank sheer $2\frac{1}{2}$ inches thick. Her deck plank of selected white pine, $2\frac{1}{2} \times 2\frac{1}{2}$, will be fastened with gun-metal "lag screws" from the underneath side of the angle iron beams. The bulwark stanchions will be of locust, and the strakes wrought with Spanish cedar. Rail, hatch coverings, skylights and companions will all be wrought teakwood, but the coamings of the engine and boiler hatch will be of plate, carried 10 inches above the deck. The upper deck will be flush from stem to stern, except a pilot-house built in cedar just forward of the foremast. This house will contain the smoking-room and the galley.

Quarters for the officers and crew will be arranged forward of the boiler-room, while the cabin proper will be abaft the engine-room, all being below deck. This style is a reversal of the present method of arranging the accommodations in steam yachts, but it is at least, the sailors being forward, "ship-shape." Above deck she will carry a light fore-and-aft schooner rig, with pole topmasts.

She will be propelled by a compound inverted tandem condensing engine of the same type, style, arrangement, &c., as the yacht *Stranger*, or rather as near to it as can be copied. The high-pressure cylinder will be 38 inches in diameter and the low-pressure 20 inches; stroke of piston will be 24 inches. The working pressure is calculated to be 125 pounds per square inch, and the propelling shaft ($7\frac{1}{2}$ inches in diameter), piston-rods, connecting-rods, &c., will all be built of steel. Steam will be supplied by two horizontal tubular boilers, which will stand fore and aft in the boiler-room. Each boiler will be 9 feet 6 inches long, 6 feet 6 inches broad and 9 feet 6 inches high, and of the "leg" type of marine boiler. The shells will be of steel, $\frac{3}{4}$ inch thick, and be tested to stand 190 pounds pressure per square inch. Her screw-propeller wheel will be about 8 feet 6 inches in diameter, with which it is hoped that the very modest

speed of 15 statute miles an hour may be achieved. All modern engine appurtenances, pumps, &c., together with the most modern appliances for working ship—steam capstan, steam-steering gear, &c.—will be supplied to this yacht, regardless of expense, their practical efficiency being the objective point in their selection. Her dimensions are as follows:

Length over all.....143 feet
Length on water line.....127 feet
Breadth.....18 feet
Depth of hold.....11 feet 6 inches
Draft of water.....10 feet 2 inches
Displacement.....184 tons

In proportion to her length, says the *New York Herald*, this new steam boat is both narrow and deep, when compared with the American type of similar craft. The model, too, in its vertical and longitudinal sharpness at bow and stern, is as keen as ever was seen about here, but this seeming lack of displacement is compensated (to the eye, at least) by the full midship section, which, viewed in conjunction with her other cardinal elements, is certainly a striking feature in her design. In its shape from the keel to the water line the mid-section is nearly, if not quite, a circle, being drawn, apparently, to inclose the greatest possible area with the least possible perimeter, a shape which makes the ratio of the under-water body to the surface of the water line very large, as it is in the deep-draft, cutter sailing yachts. Such a distribution of buoyancy—in the matter of its relative height—gives a small metacentric height which conduces to the ease and steadiness of the vessel's motion in rough water, though she may incline through large angles when rolling. It is beyond all controversy, too, that the elimination of this abnormal buoyancy by the contraction of a sea-going craft's breadth in naval design is directly conducive to her speed, all other things being equal.

Foundry Experiments at St. Louis.

The experiments which the Standard Foundry Company have been carrying on with their small cupola have resulted very satisfactorily, and in so resulting have upset the views of a number of old foundrymen. These thought that a cupola having an inside diameter of only 20 inches would not work, for the very simple reason that it would choke up. On Friday, the 29th ult., one of several fairly representative trials were had with this cupola, and from notes then taken the following results are given: The blast was turned on at 10.5 a. m.; the tap-hole was closed at 10.20; the first iron (700 pounds) was taken at 10.35; the bottom was dropped at 12.15 p. m. In all 4500 pounds of iron were taken out during the heat, and 1 pound of fuel was burned to 7 pounds of iron melted. In the afternoon the company charged up and relighted at 2.30, and during the rest of the day took out about 500 pounds of iron every 12 minutes. In fine, the results were substantially the same in the afternoon as were obtained during the morning heat. The object of the company's experiments is to demonstrate the practicability and profitability of running a small cupola from 10 o'clock in the morning all day. There are a great many breakdown jobs which such a course would probably bring in their way.—*Age of Steel*.

Messrs. Cassell & Co., of New York, publishers of the *Magazine of Art*, have sent us a copy of an etching by Mr. J. A. S. Monks, entitled "Crossing the Pasture," which is given to all subscribers to the *Magazine* for 1885. We understand that Mr. Monks's original water-color drawing was recently exhibited at the National Academy

of Design, where it attracted a good deal of attention and praise, and those who have examined the etching which he made from it cannot but agree that it is admirably executed throughout. We quite agree with the publishers when they say that there is a great deal of charming sentiment in this picture, which, when appropriately framed, will be an attraction to any wall, or in a portfolio will honor any collection.

Messrs. Clem & Morse, of Nos. 411 and 413 Cherry street, Philadelphia, have purchased the property at Frankford road and Wildy street formerly occupied by Martin Landenburger as a sawmill factory, and will use it as an elevator manufactory. The lot has a frontage of 50 feet on Frankford road and extends back about 360 feet to Shackamaxon street, with a frontage there of 60 feet. In addition to the 4-story building, 50 x 251, including engine, boiler house and stables, which is being fitted with the necessary shafting and machinery, the firm will erect a 1-story factory, 93 x 60, fronting on Shackamaxon street. The works will be moved from the present stand on Cherry street as soon as the new building can be got ready, but they will still keep their down town office at the old stand on Cherry street. The price paid for the lot and factory was \$40,000.

In the so-called "head money" cases the United States Supreme Court on the 8th decided that the 50-cent tax laid on immigrants was Constitutional. It held that the object was humane, and in the interest of the newcomers; that the States did not possess the power to lay it; that it must therefore reside in Congress; that it has formerly been decided that if such laws conflict with treaties the courts must uphold the law; that this tax, so far as it is a tax, is laid, not on the immigrant, but on the business of carrying passengers, and is everywhere equal at our ports; but that this is not in a true sense a tax, but a commercial regulation, since it is not applied to the use of the General Government. Opinion by Justice Miller.

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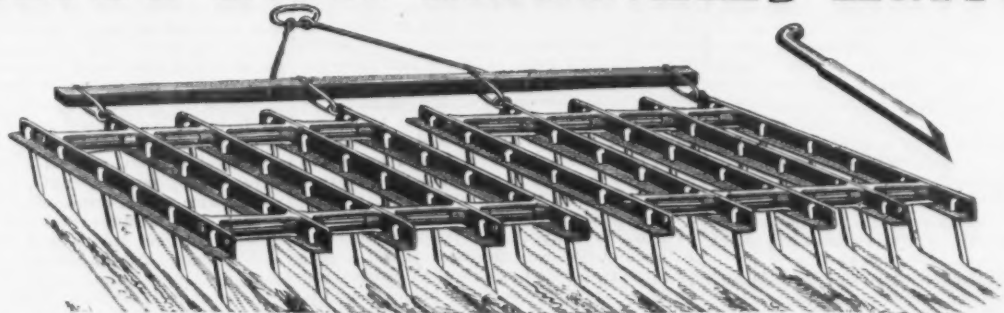
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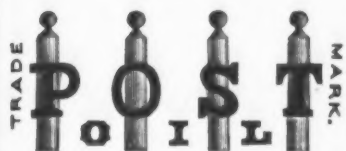
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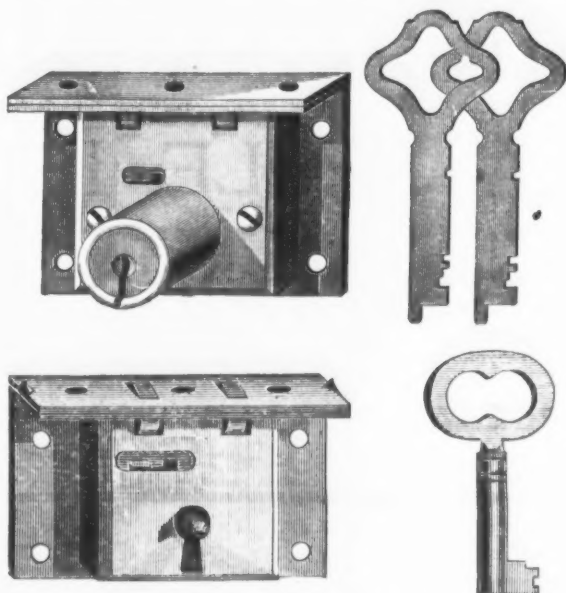
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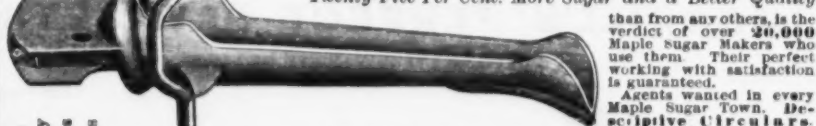
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Report of the Secretary of the Navy.

After referring to the new cruisers, Secretary Chandler says the department is confirmed in the opinion that the criticisms advanced last year against the new ships were of little moment or based upon theories at variance with the progress of modern ship-building. As to the want of full sail power and the absence of sheathing, it appears that the British Admiralty is now building steel cruisers, of the Leander and Mersey classes, absolutely without masts or sails and unsheathed. The objections to the machinery of the Chicago are met by the satisfactory performances of the Louisiana, a vessel with machinery generally similar. As to the peculiar features of the Boston, it is to be noticed that the same features are to be found in the new Chilean vessel, the Esmeralda, the latest development of naval construction in England. Comparisons of speed between the new cruisers and the great Transatlantic racing steamers are unfair, because the latter attain their speed only by the sacrifice of qualities essential to a ship of war. They are unprotected, unwieldy and of enormous draft and dimensions. The number of them possessing very high speed is small, and the new cruisers could overtake 96 per cent. of the merchant steamers of the world.

The steel forgings for the 6-inch guns of the new cruisers are being made at the Midvale Steel Works, Philadelphia, and those for the 8-inch guns in England. There being no plant in this country capable of producing 8-inch forgings, the Government is compelled to employ foreign manufacturers. The machine finishing of the guns is being done partly at the Washington Navy Yard and partly at the South Boston Iron Works and the West Point Foundry. The manufacture of modern high-power guns, such as are required for the new cruisers, being wholly new in this country, is slow and difficult, and the cost here is necessarily greater than if they were procured abroad. The armor of the Miantonomah is nearly completed and in place. The machinery of the Amphitrite and Terror is about one-half completed, while that of the Puritan is finished. No work has been done upon the hulls of the monitors. Common prudence demands that immediate steps be taken to remedy the defenseless condition of our coasts and harbors, and the most rapid and economical measure which can be adopted at the present time is to push the partially constructed monitors to completion.

The report states that the Advisory Board recommends the construction of one cruiser of 4500 tons, one cruiser of 3000 tons, one dispatch vessel of 1500 tons, two heavily-armed gunboats of 1500 tons each, one light gunboat of 750 tons, one steel ram, one cruising torpedo boat, two harbor torpedo boats, and one armored vessel not exceeding 7000 tons. The department, in adopting the recommendation, calls special attention to the necessity for torpedo boats. In general the Secretary recommends the construction of seven modern cruisers annually for a period of 10 years. Such a plan, he says, while conforming to the conservative demands of national policy, and affording ample time for adopting every new device in construction, would give the country at moderate cost a navy adequate to train its officers and maintain its safety and honor.

In regard to the existing navy, Secretary Chandler says: "It appears from the condition of the fleet that at the end of 15 years the only cruising vessels of the present list remaining will be three small iron vessels—the Monocacy, Alert and Ranger. The limitation of repairs of wooden vessels should continue at 20 per cent. of the cost, as the department has for two years earnestly advocated. The real explanation of the disproportion between the expenditures and the results accomplished in naval administration is to be found in the policy of attempting at great cost to rehabilitate worn-out structures under the name of repairs. Repair and reconstruction, in the absence of a fixed limit, are terms easily interchangeable, and the published statements of expenditure under the first name during many years show that it is only too apt to mean the second. The bureaus are unrestricted in their expenditures for repairs, except by the gross amount of their annual appropriations. The practice of reconstructing vessels under the name of repair is the only pretext upon which our overgrown navy-yard establishments could be justified, and it appears that, instead of maintaining our yards for the advantage and benefit of our ships, the ships have dragged out a protracted existence for the benefit of the yards."

Concerning navy yards, the Secretary holds that only two naval workshops should be maintained on the Atlantic coast and one on the Pacific. The New London yard should be restored to Connecticut and the League Island yard to Philadelphia. The Boston yard should be sold or reduced in size. The Pensacola and Portsmouth yards may be kept for naval stations. The workshops would then be at New York, Norfolk and Mare Island. In conclusion, Secretary Chandler dwells upon the close connection between the improvement of the navy and the development of merchant marine, and shows that, to make the latter commensurate with the trade of the country, the coast line and the number and wealth of the commercial cities of the United States, we must have great lines of ocean steamships, of high speed and large capacity, carrying the Stars and Stripes to the most distant lands. The only way to accomplish this result, he says, is through direct encouragement given by the Government, either in the form of bounties upon construction or of payment for carrying the mails, so that American capitalists will be induced to embark in the business.

The Money of the United States.—It appears from the report of Mr. Burchard, director of the Mint, that the production of specie in 1884 has probably been about \$29,000,000 gold and \$48,000,000 silver at the standard coining rate. He believes that the consumption of gold in the arts is not less than \$14,500,000, which is just half the amount produced. On the other hand, the consumption of silver in the arts he reports at \$5,500,000, leaving \$42,500,000 silver to be added to the supply. Deduct the \$28,000,000 coined, and it appears that about

\$14,000,000 still remain for export or to be added to the accumulated stock of the country. The total circulation October 1 Mr. Burchard estimates at \$610,500,000 gold and \$262,000,000 silver. Adding various kinds of paper money, the aggregate circulation reported is \$1,094,412,324, of which he reports that \$1,094,000,000 was held by the public, not in the Treasury nor in the national banks. This enormous supply of currency, greater in proportion to population than any other important Government, excepting France, has been able to maintain, is the less necessary in this country because far greater use is made here than anywhere else of bank deposits, checks and drafts and of savings-bank deposits. The supply, that we have is far in excess of present wants, and the superfluity tends to disturb all trade and to render all industry uncertain and unprofitable.

Completion of the Washington Monument.

On the 6th inst. the booming of cannon and shrieking of steam whistles announced to the people of Washington that the cap stone of the Washington Monument had been successfully laid. Shortly afterward the block which forms the apex of the pyramidal roof of the highest structure raised by human hands was set in its place, and an American flag was seen floating from the head of the staff above it. The mortar in which the cap stone rests was laid by Colonel Casey and his assistants, in the presence of a few spectators who had braved the storm of rain and wind to see the finishing touches given to the great monument which rears its head 555 feet above the earth. Colonel Casey has been in charge of the work for the last six years, and no accident causing loss of life has happened in that period, owing to the great care exercised. The official ceremonies to mark the completion of the monument will take place on February 22, the 153d anniversary of Washington's birth. They will be under the direction of a joint commission of the Senate and House of Representatives.

The corner stone of the monument was laid on July 4, 1848, in the presence of President Polk, the Vice-President, members of the Cabinet, Senators, Representatives and a host of other persons. Robert C. Winthrop, then Speaker of the house of Representatives, delivered the oration. It is expected that he will deliver the inaugural address on the completion of the shaft next February. In 1854 the funds of the monument society were exhausted, the shaft having at that time reached the height of 175 feet, after an expenditure of \$230,000. In 1873 and 1874 efforts were made to secure appropriations to insure the completion of the work by the time for the opening of the Centennial Exposition of 1876, but they failed. In the latter year however, an appropriation was made, and since that time the work has steadily advanced. It is expected that about two years more will be required for the final completion of the interior and base of the monument.

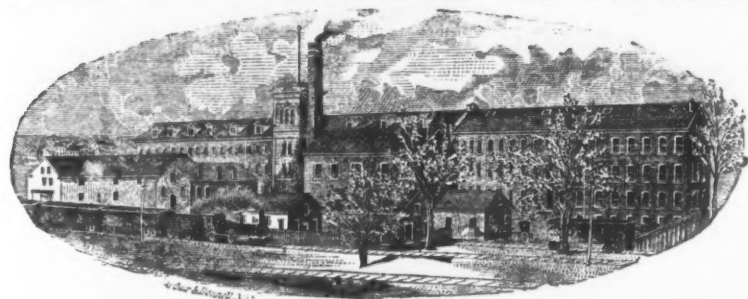
The Hazelton Boiler.—A very satisfactory test of the Hazelton boiler was recently made by Edward S. Stokes's yacht, the Fra Diavolo. With her old boiler the Fra Diavolo made between 10 and 12 miles an hour; with the new one she made between 16 and 17. Her old boiler weighed 11 tons; the new one weighs 7, and the saving of fuel is fully 30 per cent. The old boiler had about 400 feet of heating surface. The new one has 1000 feet and makes steam in 30 minutes, while it took the old one about two hours and a half. The old boiler produced at the utmost 140 revolutions of the cylinder per minute. The new one averaged 163 per minute on the trial trip, and ran very steadily. The horse-power developed was 750, which was about 1 horse-power to 2 1/2 feet of heating surface. This was considered a very remarkable result, inasmuch as the average of marine boilers is 1 horse-power to between 5 and 15 feet of heating surface. The Hazelton boiler is upright, with a center stand-pipe and tubes extending at right angles. These are closed at the outer end, and open into the stand-pipe at the other. Being heated from below, their upper surface is cooler always than the lower, and hence the necessary circulation. So far every test of this boiler has met with complete success. M. W. Hazelton is the inventor.

A Large Payment for Taxes.—After several years of litigation the officers of the New York City elevated railway companies have paid the taxes on their structures and rolling stock. Jay Gould, Cyrus W. Field and R. M. Galloway met last Saturday at the comptroller's office and paid to that official a check for \$1,285,533.51. The check was drawn on the Mercantile Trust Company, signed by R. M. Galloway, vice-president of the Manhattan Company. Comptroller Grant gave it into the custody of Chamberlain Laidlaw. This is the largest check that has been paid into the city treasury within the memory of Deputy Comptroller Storrs and the older officials of the Finance Department.

Reciprocity with Canada.—One of the largest and most enthusiastic meetings of the Chamber of Commerce ever held at Halifax, N. S., took place there on the 4th inst., to discuss the subject of reciprocity with the United States, in accordance with a resolution of the St. John Board of Trade. After several speeches a motion was unanimously adopted that the Executive Committee be instructed to prepare a memorial to the Dominion Government, asking for negotiations in favor of a reciprocity treaty, and embodying such arguments and statistical information in favor of the same as they may deem fit.

After years of experiment a harvester has been perfected which, if its workings be all that is claimed for it, will prove of immense utility to the sugar planter as well as the corn grower. One man and a boy, it is said, with a good team is sufficient to operate this machine, and will accomplish the labor of several hundred industrious negroes.

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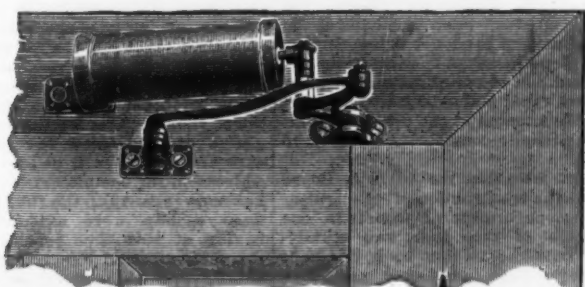
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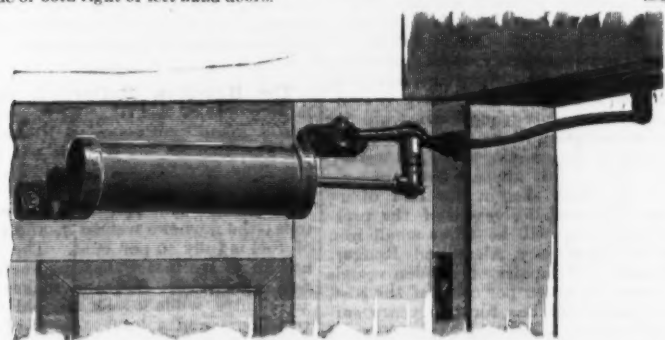
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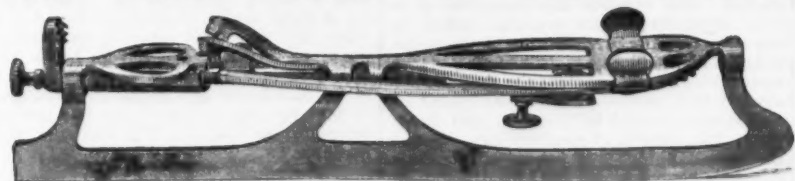
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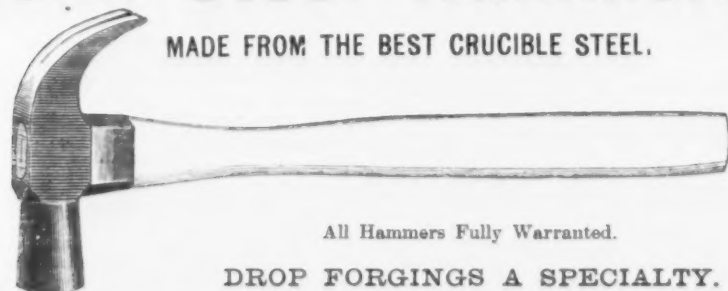
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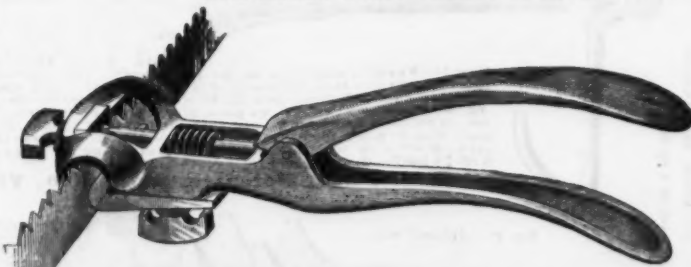
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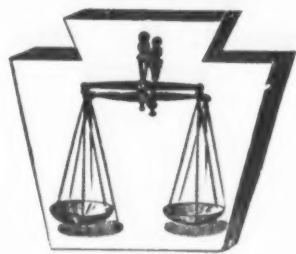
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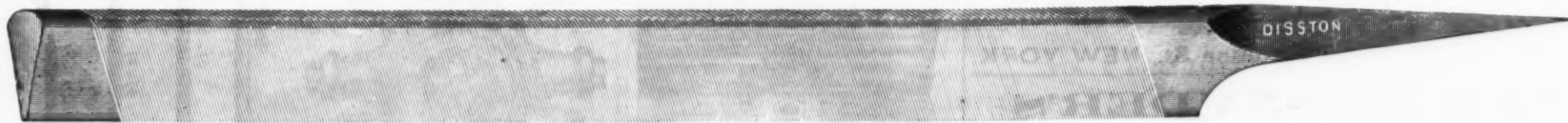
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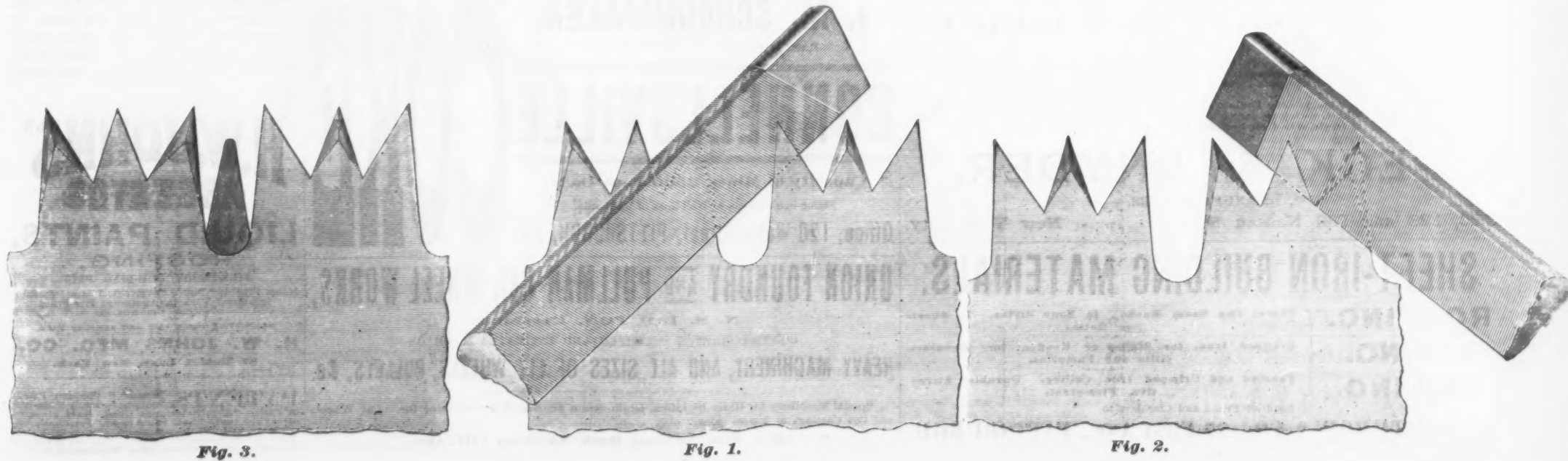


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Fig. 3 shows the section of the file in the gullet of the saw.



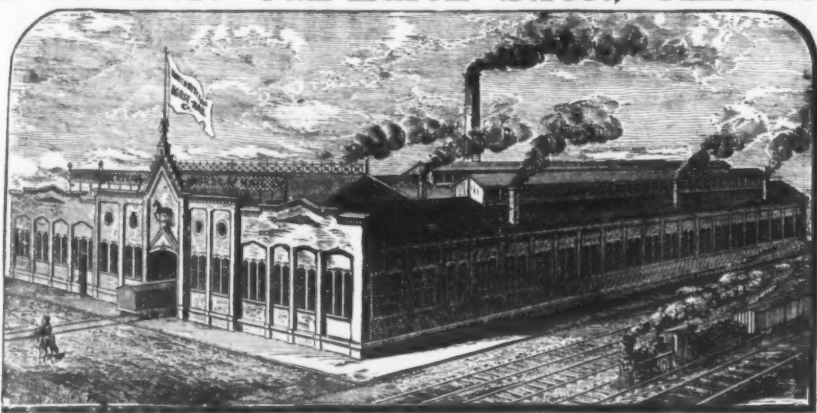
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Yours faithfully,
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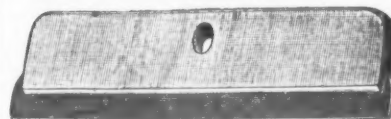


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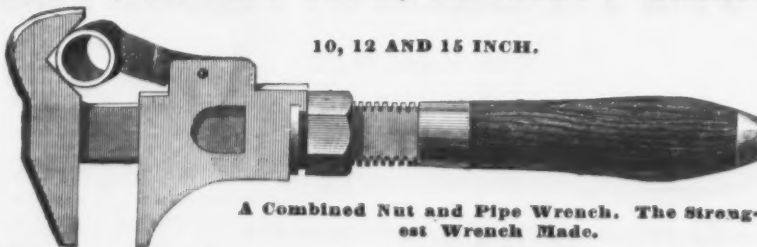
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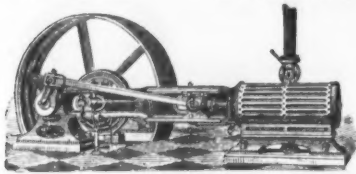
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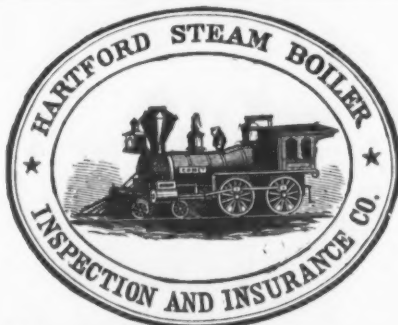


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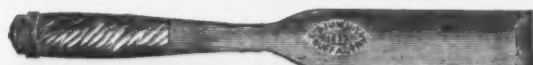
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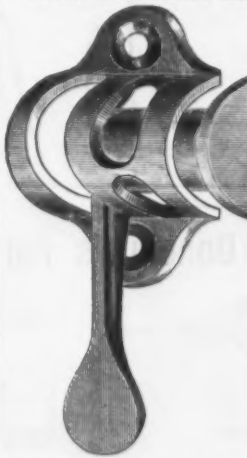
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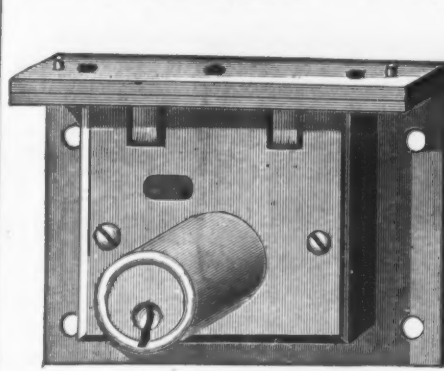
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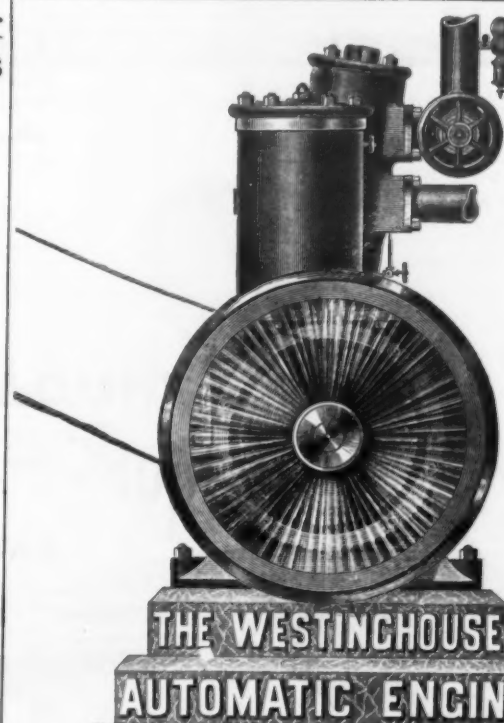
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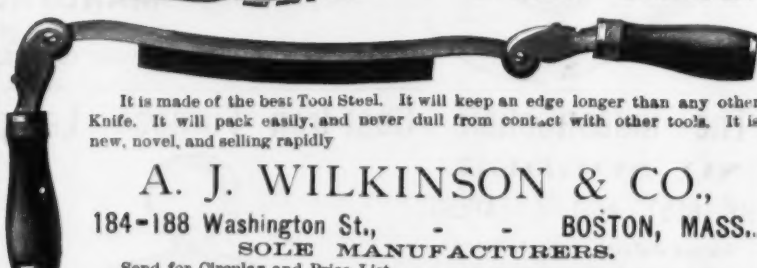


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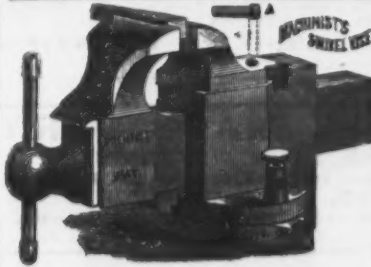
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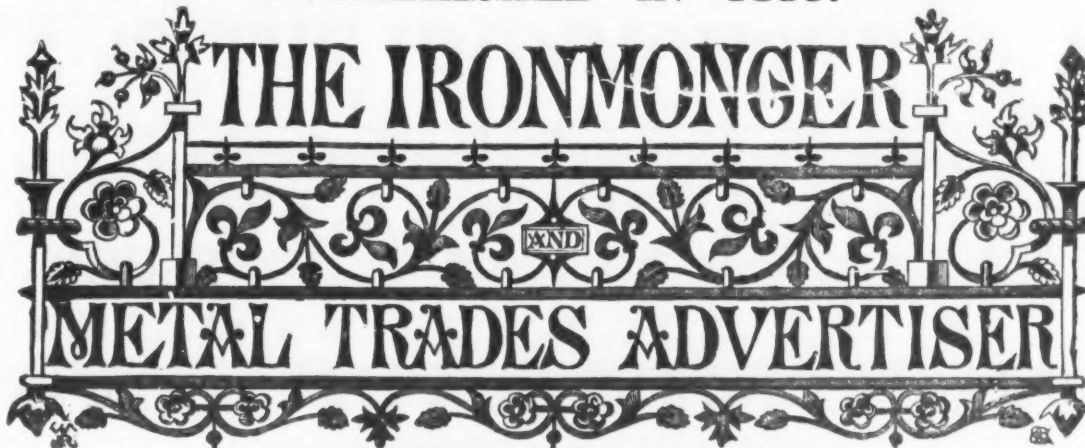
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With which is incorporated The Universal Engineer.

is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the next twelve months will be as follows:

JANUARY 3 and 31, FEBRUARY 28, MARCH 28, APRIL 25, MAY 23, JUNE 20, July 18, AUGUST 15, SEPTEMBER 5, OCTOBER 3 and 31, 1885.

This supplement is published in

FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach, but in the native language of eighty millions of German, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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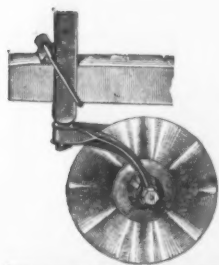
THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of more than twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger and Foreign Supplement* is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.

GEO. K. OYLER MFG. CO.,

ST. LOUIS, MO.,

MANUFACTURE ALL KINDS OF

**CASTER AND ADJUSTABLE
ROLLING COLTERS,**

FOR WOOD OR STEEL BEAM PLOWS.

WRITE FOR PRICE LIST.

FRUIT WINE
AWARDED FIRST PREMIUM EVERYWHERE
20 DIFFERENT SIZES FROM \$2.75 TO \$100
& JELLY PRESS

MOLASSES
40'S
SAUSAGE STUFFER

ENTERPRISE MFG. CO.
THIRD & DAUPHIN STS. PHILADELPHIA
PA.

Mrs. Potts'
COLD HANDLE SAD IRONS
SENT FOR ILLUSTRATED CATALOGUE FREE.

SELF MEASURING FAUCET

SELF WEIGHING CHEESE KNIFE
ARE THE BEST

Nº20 COFFEE MILL

SMOKED
BEEF SHAVES

MEAT CHOPPER

BUNG HOLE BORER TOBACCO

& ROOT CUTTER

WROUGHT IRON TACKLE BLOCKS,Swivel Hooks for Rope or Chain,
POLISHED GROOVES, ALL SIZES IN STOCK.

Also Pulley Blocks for Wire Rope.

HEADQUARTERS FOR THE

IRVING BRAND WOODEN PULLEY BLOCKS.**McCOY & SANDERS,**

MANUFACTURERS,

26 Warren Street, - - NEW YORK.

J. E. REDFIELD,
MANUFACTURER OF
TAPS, REAMERS, SCREW PLATES, &c.
ESSEX, CONN.

Our Taps are all Machine Relieved, and we guarantee them to give satisfaction.

THE CINCINNATI CORRUGATING CO.,
CINCINNATI, OHIO.

CORRUGATED SHEET IRON.

MANUFACTURERS OF Superior Corrugated Roofing, Siding, Ceiling, Arches, Lat Etc.

For Rolling Mills, Blast Furnaces, Foundries, Machine Shops, Car Shops, Boiler and Engine Rooms, Etc.

Fire, Water and Wind Proof. Light, Cheap and Durable.

Send for Descriptive Illustrated Catalogue.

"MORTON'S METAL"

(Registered Trade-Mark, May 1st, 1883.)

CABLE CHAIN.

CABLE AND CHAMPION SASH-CHAINS
AND
PATENTED ATTACHMENTS.

The most RELIABLE and CHEAPEST article in the market for suspending WINDOW SASHES. Has Great Tensile Strength, can be easily applied to any window, and gives SATISFACTION wherever used. Liberal Discount to the Trade. Now in use in all the leading cities throughout the United States. Have just furnished Chains to the following buildings: Mutual Life Insurance Co., Hoffman House, Williamsburg Fire Insurance Co. and the Navajo Flats.

Samples Sent to Any Hardware House Free on Application.

MANUFACTURED ONLY BY
THOMAS MORTON,
65 ELIZABETH ST., NEW YORK.

**B. KREISCHER & SONS,
FIRE BRICK.**

BEST AND CHEAPEST.

Established 1846.

Office, foot of Houston Street, East River
NEW YORK.**NEWTON & CO.,**

ALBANY, N. Y.,

MANUFACTURERS OF BEST QUALITY

**FIRE BRICK
AND
STOVE LININGS.****M. D. VALENTINE & BRO.,**

MANUFACTURERS OF

FIRE BRICK

And Furnace Blocks.

DRAIN PIPE AND LAND TILE,

Woodbridge, - - N. J.

BORGNER & O'BRIEN,

MANUFACTURERS

FIRE BRICKEdge Pressed Furnace Blocks,
CLAY RETORTS, TILES, &c.Twenty-third Street,
Above Race, PHILADELPHIA.
Twenty years' practical Experience.**WOODBRIDGE CLAY MINING & REFIN'G CO.**ADDRESS: Woodbridge, N. J. FACTORY AT
Spa Spring Station, P. R. R. N. J.**FIRE BRICK.**S. G. PHILLIPS, Pres., WM. H. LIVINGOOD, Sec. & Treas.,
Woodbridge, N. J. Reading, Pa.**WATSON FIRE BRICK CO.,**

Established 1836.

Successors to JOHN R. WATSON, Perth Amboy, New Jersey,
Manufacturers of**FIRE BRICK,**FOR ROLLING MILLS, BLAST FURNACES, FOUN-
DRIES, GAS WORKS, LIME KILNS, TANNERIES,
BOILER AND GRATE SETTING, GLASS WORKS, &c
Fire Clays, Fire Sand and Kaolin for Sale.**TROY FIRE BRICK WORKS,**

TROY, N. Y.

James Ostrander & Son,

Established 1848. Manufacturers of

FIRE BRICK,Tuyers, Tiles, Blast Furnace Blocks, &c. Miners
and Dealers in Woodbridge Fire Clay and Sand,
Staten Island Kaolin.

ESTABLISHED 1864.

JAMES GARDNER,

Successor to GARDNER BROS.,

MANUFACTURER OF

**"STANDARD SAVAGE" FIRE BRICK,
TILE & FURNACE BLOCKS,**

OF ALL SHAPES AND SIZES

Miner and Shipper of "Mount Savage" Fire Clay.

WORKS, Ellerslie, Allegheny Co., Md.

MAIN OFFICE, Cumberland, Md., P. O. Box 93.

BRANCH OFFICE, Pittsburgh, Pa., P. O. Box 373.

S. M. Hamilton & Co., Agents, Baltimore, Md.

UNION MINING COMPANY.**Mount Savage Fire Brick.****EDWARD J. ETTING, Agent,**
929 South Third St., Philadelphia, Pa.

**EXCELSIOR AND
CLIPPER
LAWN MOWERS**

GUARANTEED
BEST & CHEAPEST
LARGE REDUCTION
IN PRICE

HAND MOWERS
10 TO 20 IN.

HORSE MOWERS
25 TO 40 IN.

**CHADBORN & COLDWELL
MANUF'G CO.
NEWBURGH, N. Y.**

Send for Circular & Price List

Self-Binders for The Iron Age.

**The Iron Age
Self-Binder.**

PRICES.
Full Cloth, \$1.25
Half Roan, \$1.50

We are now prepared to supply our subscribers with an excellent self-binder for their papers, a cut of which is annexed. We call attention to the low prices at which it is offered. Address all orders to
DAVID WILLIAMS,
83 Reade Street, New York.

**Prouty's Patent
PEERLESS
FORCE PUMP.**

Has Self-Adjustable Foot Rest.

NEW AUTOMATIC COMPENSATING
PACKING.It will throw a continuous jet FROM
FORTY TO SIXTY FEET. A new pattern
jet and spray nozzle is sent with each
pump.Especially attention is called to the
material and workmanship exhibited
in these pumps.**THE NEW ENGLAND BUTT CO.**

PROVIDENCE, R. I.

NEW YORK OFFICE, 99 Chambers St.

No. 1 "ECLIPSE" PIPE MACHINE
IS JUST THE TOOL FOR
PLUMBERS AND
PIPE-
FITTERS.

Cancoast & Maule
No. 2 & 3 "ECLIPSE"
Can easily be worked
durable and
worthy the
have to

"ECLIPSE" PIPE CUTTING MACHINE
No. 1.
CUTS AND THREADS PIPES 1/2 TO 2 INCHES.

"ECLIPSE" PIPE MACHINES Nos. 2 and 3.
No. 2 CUTS
2 1/2 to 4 in.
No. 3 CUTS
2 1/2 to 6 in.

It is Simple, Power-
ful, easily carried
about, and
Cheap.

Philadelphia, Pa.
PIPE MACHINES
by one man.
efficient Tools, and
notice of all who
cut large
Pipes.

LANE'S PATENT DOOR HANGER.

THE MOST PERFECT ANTI-FRICTION HANGER IN THE MARKET, BECAUSE

It is made entirely of Wrought Iron, except the Wheel, which has a Steel Axle.

It will not break.
It is practically free from wear.
It is almost noiseless in action.
It requires no oil.
It has a broad bearing on the door, and keeps it in
line.
It is by far the most desirable.
It may be used with any track.
It is always in order.

LANE'S PATENT TRACK
is made of flat wrought iron and is easily put in
position.
Catches and holds no snow or ice.
Door hangs thereon cannot jump the track.
Is not subject to
decay.
Requires no fit-
ting, but is
ready at once.

MANUFACTURED
BY
**LANE
BROS.,**
POUGHKEEPSIE
N. Y.

Showing Track.

JOHN H. GRAHAM & CO., General Agents, 113 Chambers Street, NEW YORK.

The F. F. ADAMS COMPANY, Erie, Pa.

THE LATEST THING OUT.

IDEAL MOUSE TRAP.So perfectly simple in construction there is
nothing to get out of order, as is the case with all
other traps made on this principle. Guaranteed
to give perfect satisfaction. Send for sample
gross and you will not have any other trap that
catches mice alive. The inventor of the Ideal in-
vented all of the leading traps in the market to-
day, and he says this one is perfection. Great
care is taken in the manufacture of the Ideal, and
every trap is perfect. A single trap for inspection
will be sent by mail upon receipt of sec. in
stamps.
The Cyclone Mouse Trap.

We invite the attention of dealers to this "Novelty" in Mouse Traps. Patented Nov. 4, 1884, and now having an immense sale. It is clean, durable and attractive, and so sensitive that the mouse who ventures to touch his nose to the bait box is doomed. Our salesmen on the road say it is the most popular trap ever offered to the trade. One of our men in a single short trip sold 2000. The retail price is only 10 cents each, and yet they afford big profits to the dealer. We will send a sample by mail for inspection, upon receipt of five 2-cent stamps. Send for our Illustrated Catalogue.

ICE CREEPERS.

No. 4.

	Per doz.	Per gross		Per doz.	Per gross
No. 4, Corrugated Sure-Foot Creeper,	\$1.50	\$12.00	No. 7, Scott's Safety Creeper,	\$2.00	\$20.00
No. 6, Climax Reversible "	1.80	18.00	No. 9, " Arctic "	2.50	24.00
No. 8, West's Pat. Steel Wire "	2.00	21.00	No. 3, Chicago Adjustable Creeper,	4.00	36.00

Samples, one each of the above six styles, sent to the trade by mail, post-paid, for \$1.25. Dealers ordering one gross, assorted, subject to gross prices. Address
PECK & SNYDER,
126, 128 and 130 NASSAU STREET, - NEW YORK.

PHILADELPHIA.

Lloyd & Supple Hardware Co.

Term, 30 days. For 60 or 90 days, interest added at 8 per cent. per annum.

Arvils.
 Peter Wright's, # 10, 10% @ 10%
 Trenton, # 10, 10% @ 10%
 Eagle Arvils, American, 10%
Apple Parers.
 Globe Apple Parer, # 10, 10%
 Penn Apple Parer, # 10, 10%
 White Mountain, # 10, 10%
 Lots of 10 to 25 dozen, special prices.

Axes.
 Hunt's Kentucky and Yankee, # 10, 10%
 Robert Mann, # 10, 10%
 Richmond, # 10, 10%
 Beveled Axes, # 10, 10%
 Double Bit Axes, # 10, 10%
Augers and Auger Bits.—New List, January 7, 1885.

Bells.
 Bates' Nut Augers, # 10, 10%
 Cook's Augers, # 10, 10%
 Watson's Ship Augers, # 10, 10%
 Benjamin Pierce Auger Bits, # 10, 10%
 New Haven Copper Company, # 10, 10%
 Snell's Augers and Bits, # 10, 10%
 Snell's Ship Augers, # 10, 10%
 Cook's Auger Bits, # 10, 10%
 Jennings' Auger Bits, new list Jan. 1, 1884, 10%
 Bonney's Pat. Hol. Augers, list # 10, 10%
 Stearns' Pat. Hol. Augers, list # 10, 10%
Balances.
 Light and Common, # 10, 10%
 Bevin Bros. Mfg. Co. Light Hand Bells, # 10, 10%
 Swiss Pattern Hand Bells, # 10, 10%
 Connel's Door Bells, # 10, 10%
 Gt. Western & Kentucky Cow, new list, # 10, 10%

Boring Machines.
 Upright, without Augers, # 10, 10%
 Angular, without Augers, # 10, 10%
 Holes, Eastern Carriage Bells, # 10, 10%
 Philadelphia Carriage Bells, # 10, 10%
 Stanley, Wrought Shutter, # 10, 10%
 Braces, Bartlett's, # 10, 10%
 Backus, # 10, 10%
 Spofford, # 10, 10%
Butts.
 American Ball, # 10, 10%
 Butts, Cast Fast Joint, Narrow, # 10, 10%
 Cast Fast Joint, Broad, # 10, 10%
 Cast Loose Joint, Narrow, # 10, 10%
 Cast Loose Joint, Broad, # 10, 10%
 Cast Acorn, Loose Pin, # 10, 10%
 Cast Acorn, Japanese, # 10, 10%
 Cast Mayer's Loose Joint, # 10, 10%
 Wrought Loose Pin, # 10, 10%
 Wrought Table Hinges and Back Flange, # 10, 10%
 Wrought Narrow Fast, # 10, 10%
 Wrought Loose Fast, # 10, 10%

Blind Butts.
 Parker, # 10, 10%
 Clark, # 10, 10%
 Lull & Porter, # 10, 10%
 Huffer, # 10, 10%
Chisels.—Bed (new list July 1, 1885), # 10, 10%
 Plate, # 10, 10%
 Chisels, German Halter and, # 10, 10%
 Galvanized Pump, # 10, 10%
 Best Proof Cold Chisel—English, # 10, 10%
Chisels.
 Socket Framing, # 10, 10%
 Socket Framing, # 10, 10%
 Butcher's, # 10, 10%
Coffee Mills.—Box and Side (new list Jan. 1, 1885), # 10, 10%
 Enterprise, # 10, 10%
 Cutlery, Walden Pocket, # 10, 10%
 Pennsylvania Knife Co., # 10, 10%
 Landers, Fray & Clark, J. Russell & Co., Lamson & Goodnow Mfg. Co. and Meriden Cutlery Co., Manufacturers' prices net.

Drawing Knives.
 Hart Mfg. Co., # 10, 10%
 Adjustable Handle, # 10, 10%
Fry Pans.
 Tinned, # 10, 10%
 Burnished, # 10, 10%
Files.
 Nicholson, # 10, 10%
 Diston, # 10, 10%
 Butcher, # 10, 10%
Fluting Machines.
 Eagle—34 in. roll, # 10, 10%
 Eagle—34 in. roll, # 10, 10%
 Crown—34 in. roll, # 10, 10%
 Crown—34 in. roll, # 10, 10%
 Geneva Fluter, # 10, 10%
 Favorite com. Fluter and Sided Iron, # 10, 10%
Hammers.
 Yerkes & Plumb's, new list, # 10, 10%
 Mayfield Hammer, # 10, 10%
 Howell & E. Nail Hammers, # 10, 10%
Handles.
 Diston Loop Handles Cross-Cut, # 10, 10%
 Boynton Loop Handles Cross-Cut, # 10, 10%
Hatchets.
 Yerkes & Plumb, new list, # 10, 10%
 Hunt, # 10, 10%

Hinges.
 Strap and T., # 10, 10%
 Horse Nails, # 10, 10%
 Globe, # 10, 10%
 Vulcan, # 10, 10%
 Audible, # 10, 10%
 Poled and P'd, # 10, 10%
 Clinton, # 10, 10%
 Poled and P'd, # 10, 10%
Hay and Straw Knives.
 Lightnings, # 10, 10%
 Electric, # 10, 10%
 Wadsworth, # 10, 10%
 Walton Straw Knives, # 10, 10%
Leeks and Knobs.
 Bradford Loam, # 10, 10%
 Gaylor Cabinet, # 10, 10%
 Parker's Cabinet, # 10, 10%
 American Padlocks, # 10, 10%
 Scandinavian Padlocks, # 10, 10%
 No. 67, # 10, 10%
 No. 68, # 10, 10%
 No. 69, # 10, 10%
Lanterns.
 Buckeye, # 10, 10%
 Tubular, # 10, 10%
Lawn Mowers.
 Philadelphia, # 10, 10%
Lawn and Garden Pumps.
 Holland Patent, # 10, 10%
Mattresses.
 Long and Short Cutter, # 10, 10%
 Pennsylvania Pattern, # 10, 10%
Molasses Gates.
 Enterprise Mfg. Co.'s Measuring Faucets, # 10, 10%
 Stebbins' Gates, # 10, 10%
 Lincoln's Gates, # 10, 10%
 Landers, Fray & Clark's Petroleum, # 10, 10%
 Brass Liquor Cocks, new list Jan. 1, 1885, # 10, 10%
 Cork Linod Cocks, # 10, 10%

Ment Cutters.
 Dixon's, # 10, 10%
 Woodruff, # 10, 10%
 Stowe, # 10, 10%
 Hale's, # 10, 10%
Plumb and Levels.
 Stanley's Adjustable, # 10, 10%
 Stanley's Non-Adjustable, # 10, 10%
Picks.—New List, # 10, 10%
Razor Straps.
 Lamont Combination, # 10, 10%
 Imitation Emerson, # 10, 10%
Rules.—Stanley Boxwood, # 10, 10%
Stairways.—Hart Pattern, # 10, 10%
 Per doz., # 10, 10%
 American Pattern, # 10, 10%
 Per doz., # 10, 10%
 Scale Beams, # 10, 10%
 Custers, # 10, 10%

Squares.
 Steel and Iron, # 10, 10%
 Try Squares, Stanley, # 10, 10%
 Diston's Try Squares, # 10, 10%
Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened, # 10, 10%
 Clipper No. 10, Bronze Blade, Boxed and Sharpened, # 10, 10%
 Clipper No. 5, Painted Red, Boxed and Sharpened, # 10, 10%
Saws.—Diston's Hand, Panel and Rip, # 10, 10%
 Diston's Circular, # 10, 10%
 Cross-Cut No. 2, Plain Tooth, # 10, 10%
 Cross-Cut Patent Tooth, # 10, 10%
 Cross-Cut Champion Tooth, # 10, 10%

Shovels and Spades.
 Oliver Ames & Sons, new list, # 10, 10%
 Rowland, # 10, 10%
 Sed Irons, # 10, 10%
 Mrs. Fols' Patent, # 10, 10%
Stone.
 Washita Extra, # 10, 10%
 Washita No. 1, # 10, 10%
 Washita Slips, # 10, 10%
 Washita Ace, # 10, 10%
 Hindostan Oil Stone No. 1, # 10, 10%
 Hindostan Oil Stone No. 2, # 10, 10%

Stocks and Dies.
 Single No. 1, # 10, 10%
 Single No. 2, # 10, 10%
 Single No. 3, # 10, 10%
 Single No. 4, # 10, 10%
 Single No. 5, # 10, 10%
 Single No. 6, # 10, 10%
 Single No. 7, # 10, 10%
 Single No. 8, # 10, 10%
 Single No. 9, # 10, 10%
 Single No. 10, # 10, 10%

Traps.
 Genuine Oneida—Newhouse, # 10, 10%
 Oneida—Newhouse, # 10, 10%
 Oneida—Newhouse, # 10, 10%
 Oneida—Newhouse, # 10, 10%
 Oneida—Newhouse, # 10, 10%

Wire.
 Bright or Annealed, No. 0 to 18, # 10, 10%
 Bright or Annealed, No. 19 to 20, # 10, 10%
 Bright or Annealed, No. 21 to 22, # 10, 10%
 Bright or Annealed, No. 23 to 24, # 10, 10%
 Bright or Annealed, No. 25 to 26, # 10, 10%
 Bright or Annealed, No. 27 to 28, # 10, 10%
 Bright or Annealed, No. 29 to 30, # 10, 10%
 Bright or Annealed, No. 31 to 32, # 10, 10%
 Bright or Annealed, No. 33 to 34, # 10, 10%
 Bright or Annealed, No. 35 to 36, # 10, 10%

Wrenches.
 Peckless No. 2, # 10, 10%
 Peckless No. 3, # 10, 10%
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PITTSBURGH.

Merchant Iron.

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For fluctuations and discounts on card rates see weekly Pittsburgh Trade Report.

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Flat Bar.
 1 1/2 to 4 by 1/2 to 1 inch, # 10, 10%
 4 to 6 by 1/2 to 1 inch, # 10, 10%
 6 to 8 by 1/2 to 1 inch, # 10, 10%
 8 to 10 by 1/2 to 1 inch, # 10, 10%
 10 to 12 by 1/2 to 1 inch, # 10, 10%

Round and Square.
 1 1/2 to 4 by 1/2 to 1 inch, # 10, 10%
 4 to 6 by 1/2 to 1 inch, # 10, 10%
 6 to 8 by 1/2 to 1 inch, # 10, 10%
 8 to 10 by 1/2 to 1 inch, # 10, 10%
 10 to 12 by 1/2 to 1 inch, # 10, 10%

Light Bands.
 1 1/2 to 4 by 1/2 to 1 inch, # 10, 10%
 4 to 6 by 1/2 to 1 inch, # 10, 10%
 6 to 8 by 1/2 to 1 inch, # 10, 10%
 8 to 10 by 1/2 to 1 inch, # 10, 10%
 10 to 12 by 1/2 to 1 inch, # 10, 10%

Wagon Box Iron.
 1 1/2 to 4 by 1/2 to 1 inch, # 10, 10%
 4 to 6 by 1/2 to 1 inch, # 10, 10%
 6 to 8 by 1/2 to 1 inch, # 10, 10%
 8 to 10 by 1/2 to 1 inch, # 10, 10%
 10 to 12 by 1/2 to 1 inch, # 10, 10%

Double Iron.
 1 1/2 to 4 by 1/2 to 1 inch, # 10, 10%
 4 to 6 by 1/2 to 1 inch, # 10, 10%
 6 to 8 by 1/2 to 1 inch, # 10, 10%
 8 to 10 by 1/2 to 1 inch, # 10, 10%
 10 to 12 by 1/2 to 1 inch, # 10, 10%

Single Iron.
 1 1/2 to 4 by 1/2 to 1 inch, # 10, 10%
 4 to 6 by 1/2 to 1 inch, # 10, 10%
 6 to 8 by 1/2 to 1 inch, # 10, 10%
 8 to 10 by 1/2 to 1 inch, # 10, 10%
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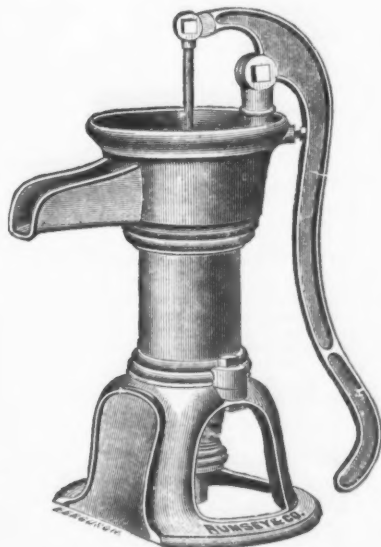
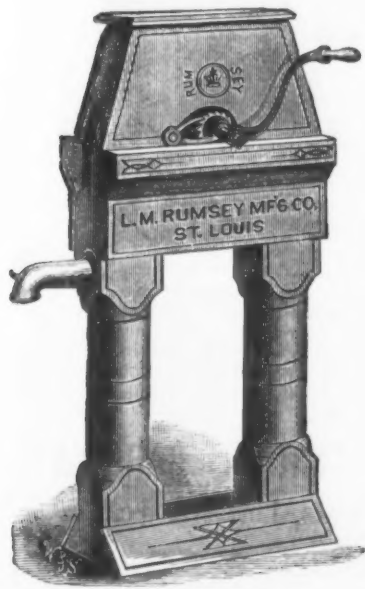
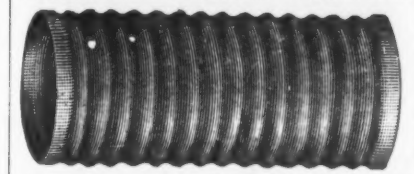
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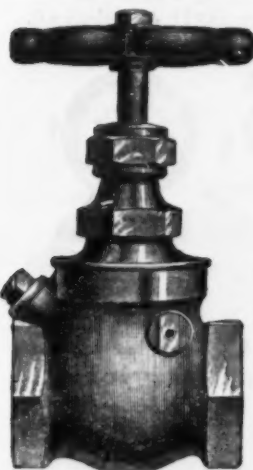
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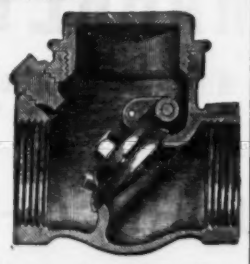
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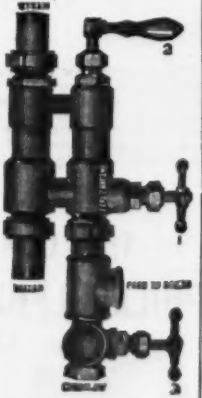
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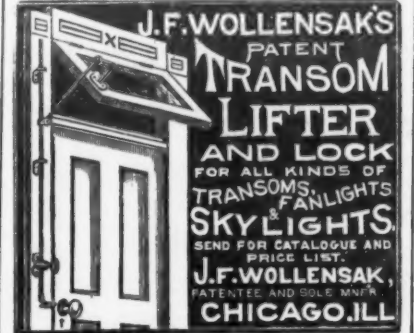
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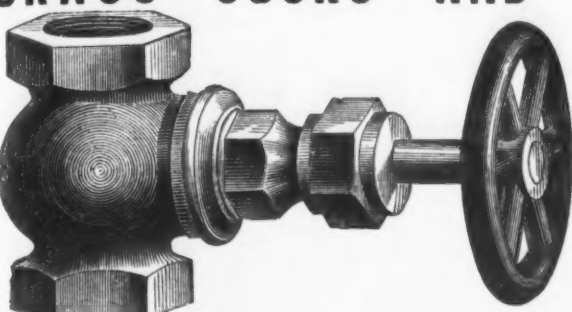
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Cutlery.—Pocket American Shear Co's.....	dis 40
Butcher Knives, Wood's, Lap Roller, Square Handle.....	dis 40
Steak Knives.....	dis 40
Lap Roller, Oval Handle.....	dis 40
Skinning.....	dis 40
Butcher, Common Round Handle, Wood's.....	dis 40
Shoe Knives, Wood's.....	dis 30
Dividers.—Cook's.....	dis 25
Dog Collars.....	dis 20
Door Springs.—T. Rod.....	dis 1.02
Imitation Torrey's Rod.....	dis 1.45
Gem Coll, new list.....	dis 50.10
Crown.....	dis 1.25
Warner's.....	dis 2.00
Door Stops.—Thurston's.....	dis 50
Drawer Knobs.—Thurston's.....	dis 50
Drills.—Morse Ritt Stock.....	dis 40
Morse Straight Shank.....	dis 10
Emery.—Wellington Mills.....	dis 10
Valpole Emery Mills.....	dis 10
Turkish, in 10 lb cans.....	dis 7
Enameled Ware.—	
Standard Mfg. Co. Kettles.....	dis 60
Standard Sauce Pans.....	dis 30
Felice Plates.—Wrought.....	dis 5
Files.—American File Co.....	dis 50
Nicholson File Co.....	dis 50
Fluting Machines.—Knox List, \$4.00.....	dis 25
Forks.—W. C. & Co. Manure.....	dis 50
Eastern Tool Co's. Manure.....	dis 50
Gimlet Bits.—	
Genuine German, No. 125, 1-32 to 8-32.....	dis 1.00
Pierce's.....	dis 1.00
Glass Cutters.—Combination Glass Cutter and Knife Sharpener.....	dis 1.00
Grub Hoes.—K. P. & Co's No. 2, \$11.50 per doz.....	dis 50 & 16
Hammers.—Maydole's.....	dis 15
Hartford Hammer Co.....	dis 15
Hammers & Rollers.—Anti-Friction.....	dis 50
Acme Rollers.....	dis 50
Climax.....	dis 50
Common Rollers.....	dis 50
Victor Hangers.....	dis 33
Victor Hangers.....	dis 33
Hand Screws.....	dis 10
Hatchets.—C. F. Dowse, new list.....	dis 35
Underhill.....	dis 35
Hay Knives.—Lighting.....	dis 18.00, net
Hinges.—Strap and T (new list).....	dis 60.10
Providence Plate.....	dis 5
Wrought Screw Hook.....	dis 15
Hoes.—Eastern Tool Co.....	dis 60.10
W. C. & Co's.....	dis 60
Hooks and Staples.—Brewers (new list).....	dis 60
Horse Nails.....	No. 6 7 8 9
Putnam Pointed.....	dis 50
Bridgewater.....	dis 19 18 17.....
Ice Cream Freezers.—Packer's, new list.....	dis 50.5
Knobs.—"Norwalk." New list.....	dis 60.2
Silver Glass.....	dis 50.10
Silver Glass Bell Pulls.....	dis 50.10
Lanterns.—Tabulars, No. 6.....	dis 7.50
Lawn Mowers.....	
Continental.....	dis 40.10
Quaker City.....	dis 40.5
National.....	dis 50
Lead.—Sheet.....	dis 6 & 1/2
Pipe.....	dis 6 & 1/2
Locks.—Norwalk.....	dis 60.2
Eagle Cabinet.....	dis 45
Eagle Trunk.....	dis 15
W. Wilcox & Co. Padlocks.....	dis 45
Manure Forks.—W. O. & Co.....	dis 50
Eastern Tool Co's.....	dis 50
Mattocks.....	
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Eagle Brand Tapered Sheathing.....	dis 13
Common, Dry Sheathing.....	dis 13
Eagle Brand Dry Sheathing.....	dis 13
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Pliers.—Vom Cleft & Co's.....	dis 30
Buntion's Wire Pliers.....	dis 30
Plumb & Levels.—Stanley R. & L. Co. dis 50.5	
Pocket Knives.—American Shear Co's.....	dis 40
Potato Diggers.—W. C. & Co. reduced list.....	dis 50
American Iron.....	dis 60
Pulleys.—Acme or Excelsior, 1 1/2 in.....	dis 22
Acme or Excelsior, 2 in.....	dis 25
Pulley Blocks.....	dis 40
Pumps.—Union Manufacturing Co.....	dis 40
Iron Casters.....	dis 40
Iron Pitcher Spout.....	dis 50
Copper.....	dis 30
Rivets.—Black (new list).....	dis 40
Carriage in 10 lb papers (new list).....	dis 40
Copper.....	dis 50
Razors.—Torrey's.....	dis 30
Rifles.—Stanley, Boxwood.....	dis 70.10
Stanley, Ivory.....	dis 70.10
Sad Irons.—Common.....	dis 30
Laundry.....	dis 6 & 1/2
Tailors' Geese.....	dis 6
Enterprise "Fotta".....	dis 35
Sash Locks.—King & Hutchinson's, new list.....	dis 40
Sandpaper.—Baeder & Adamson.....	dis 35
Sash Weights.—Patent Eye.....	dis 13
Saws.—Hand Saws, Diston's.....	dis 20
Cross-Cut Saw.....	dis 20
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M. & D. Hand Saws.....	dis 35
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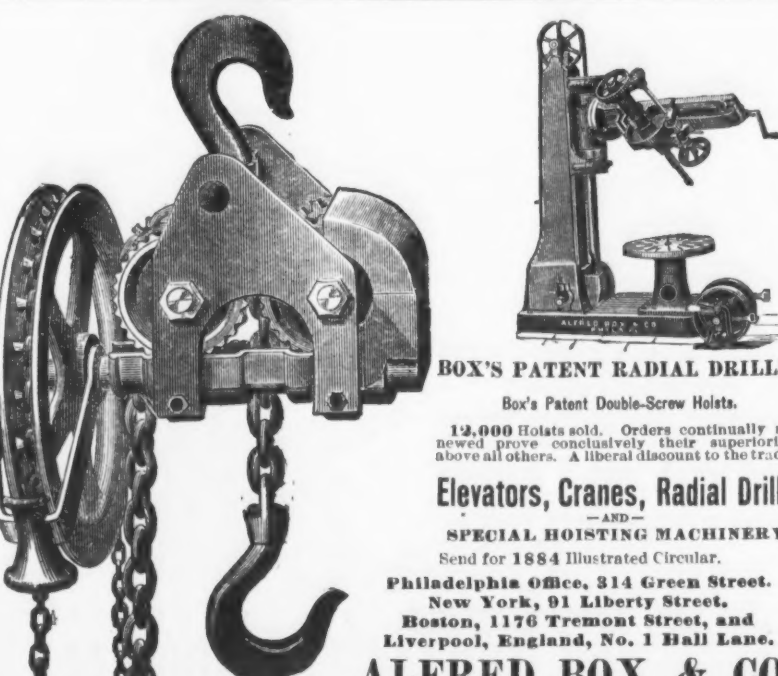
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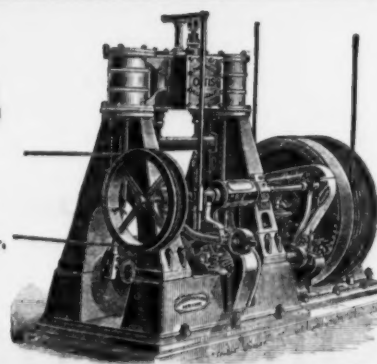


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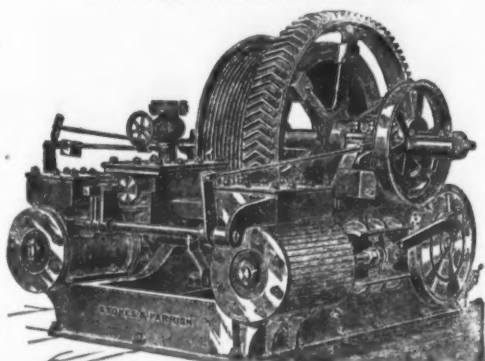
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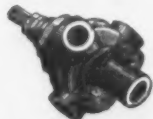
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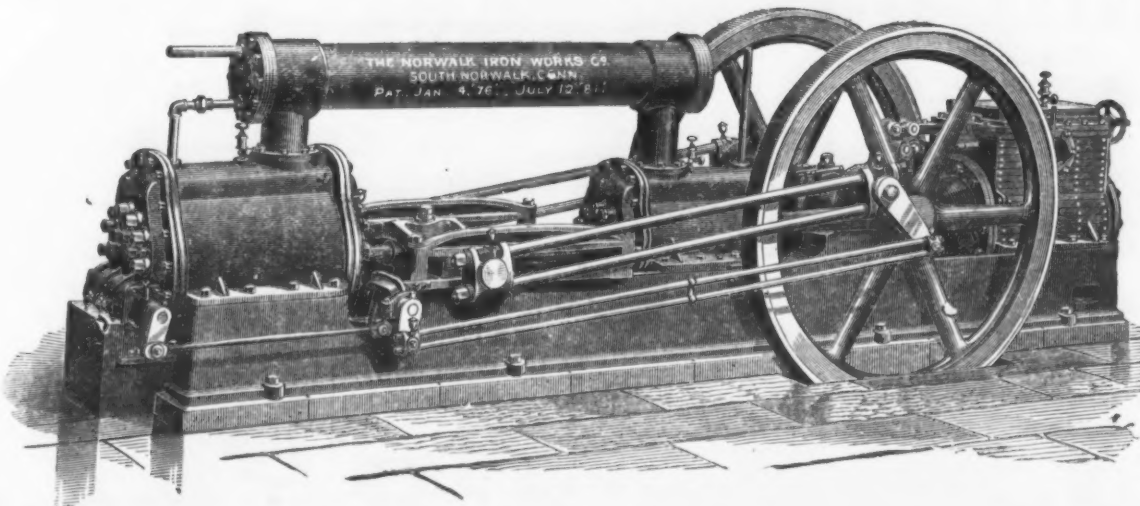


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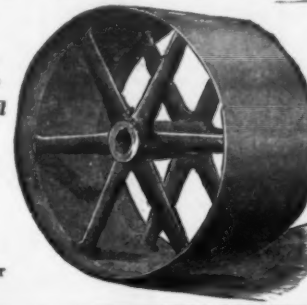
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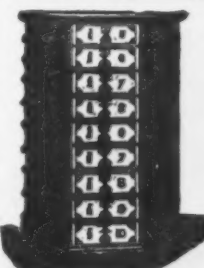
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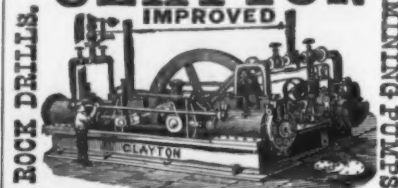
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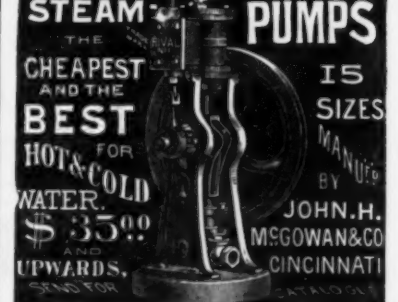
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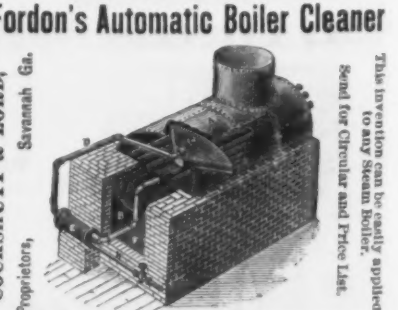


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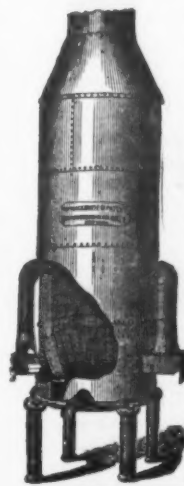
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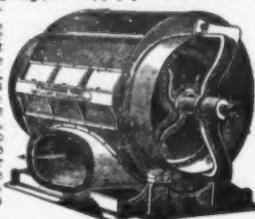
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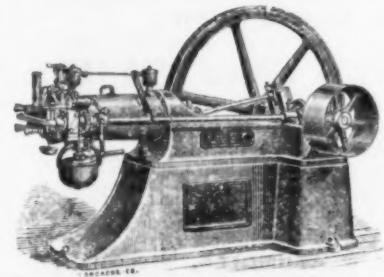
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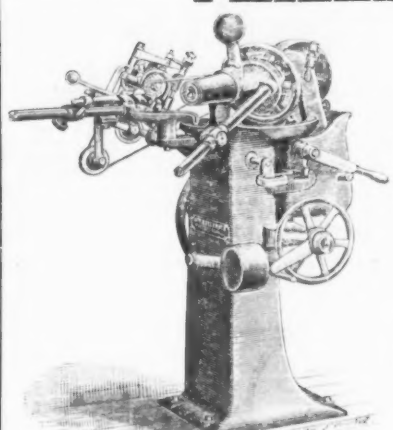
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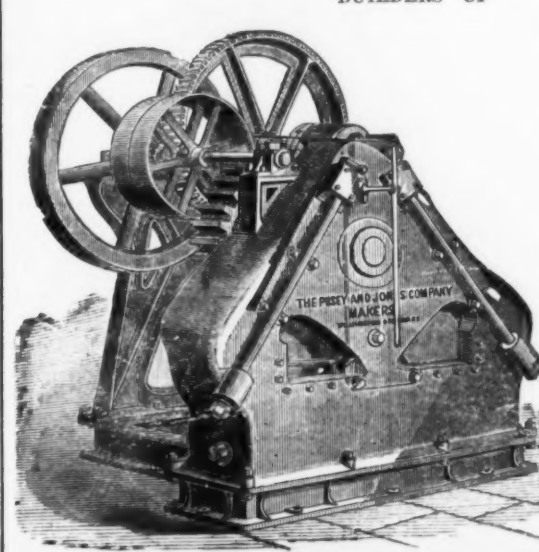
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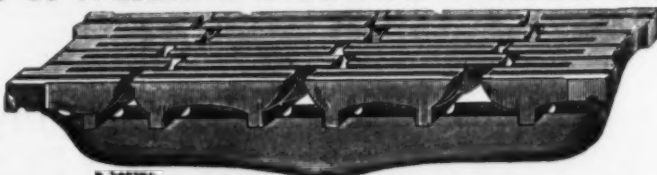
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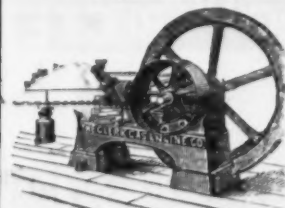
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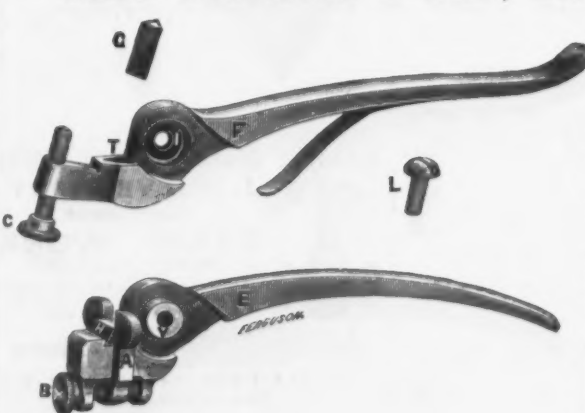
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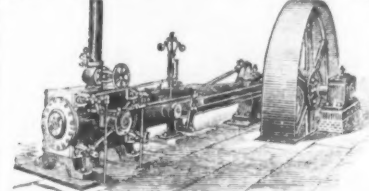
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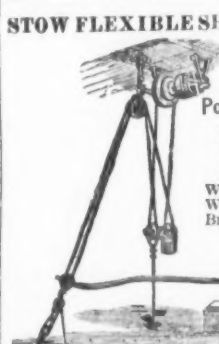
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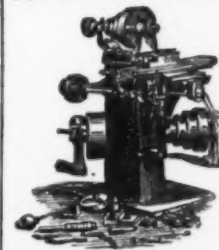
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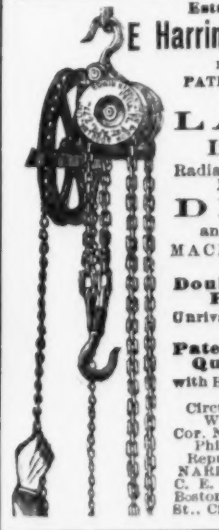
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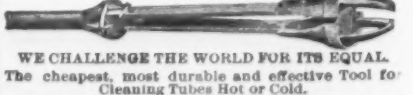
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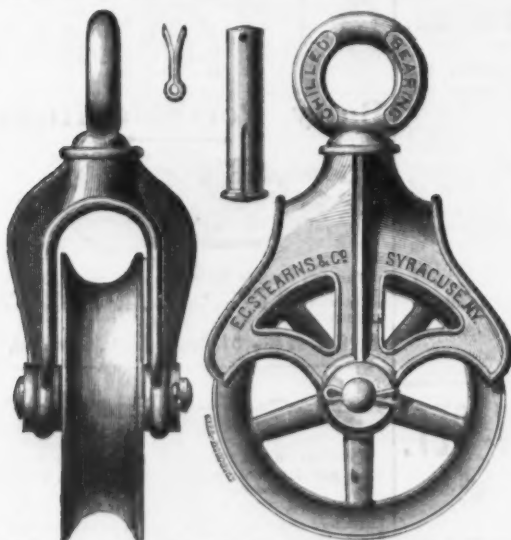
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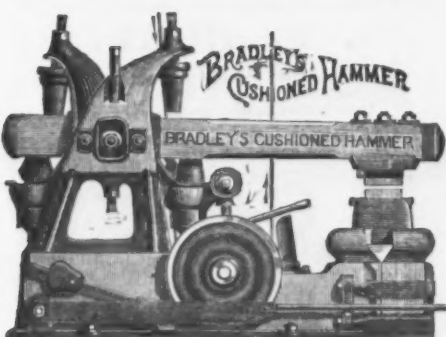
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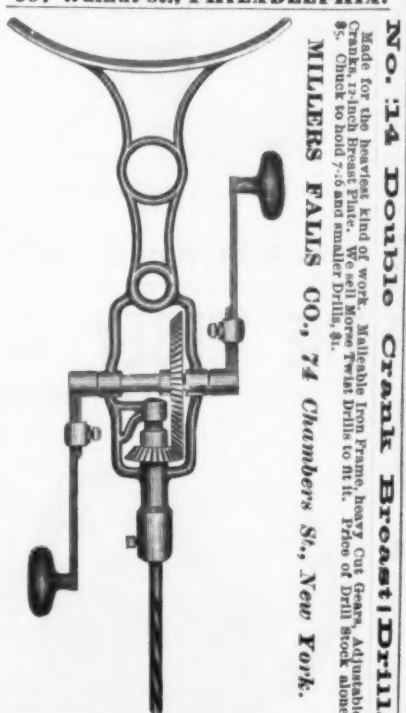
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